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Proceedings.

Chairman: Hon. Charles E. Greenlay.



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ELEVENTH ANNUAL CONFERENCE

PROVINCIAL MINISTERS
OF MINES

PROCEEDINGS



FORT GARRY HOTEL
Winnipeg
Manitoba

SEPTEMBER, 1954

PROCEEDINGS

ELEVENTH ANNUAL CONFERENCE
OF
PROVINCIAL MINISTERS OF MINES

SEPTEMBER 20, 21, 22 - 1954

FORT GARRY HOTEL

WINNIPEG

MANITOBA

THE HON. CHARLES E. GREENLAY
MINISTER OF MINES & NATURAL RESOURCES
PROVINCE OF MANITOBA
CHAIRMAN OF THE CONFERENCE

J. G. COWAN, Q. C. - DEPUTY MINISTER
DEPUTY CHAIRMAN

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FOREWORD

It has indeed been a pleasure and a honour to have played the role of host to my fellow Ministers and other delegates at the Eleventh Annual Conference of the Provincial Ministers of Mines here in Winnipeg in 1954. This is only my sophomore year as a Minister of Mines and I have found that being chairman of the Conference has given me the opportunity of gaining an insight into some of the finer details of the workings of the mining industry from coast to coast. I know the whole Conference has been of benefit to myself personally and to Manitoba in general and I feel quite sure that many of the thoughts and ideas presented and discussed will do much to further the fortunes of the mining industry across Canada.

The number of delegates present was a most agreeable surprise. We had anticipated upwards of one hundred in attendance but it is my pleasant duty to report that by the time the banquet rolled around 220 were present and accounted for. This number included, of course, a few guests of honour and the charming ladies which so many of our delegates very thoughtfully brought along. Their presence at the reception and banquet was a highlight of the conference and we sincerely hope they enjoyed the hospitality offered both there and at the other functions which were arranged for their entertainment.

It would be very remiss of me if I did not extend a very special vote of thanks to the Mid-West Mining Association for the wonderful reception which they presented prior to the banquet. This same Association also rendered yeomen service in helping to prepare for certain phases of the meeting. I am sure you will all wish to join me in voicing heartfelt appreciation.

Unfortunately, it was again impossible for a delegate from the Province of Newfoundland to be with us. Copies of the proceedings are being forwarded to the Honourable Mr. Rowe, Minister of Mines, in order that he and his staff may keep abreast of the actions and policies of the Conference. Also absent from the meeting was the Honourable M. A. Patterson, Minister of Mines for Nova Scotia. This, incidentally, is Mr. Patterson's first year as head of the Department.

The Honourable Mr. Prudam, Federal Minister of Mines and Technical Surveys, and his Deputy Minister, Mr. Marc Boyer, were with us again this year. Although holding only listening briefs I am sure the information exchanged with them cannot help but foster closer working arrangements between the Federal and Provincial Governments.

Several papers were presented at the first plenary session and I would like to avail myself of this opportunity to thank all those who expended so much time and effort to make these presentations interesting and informative.

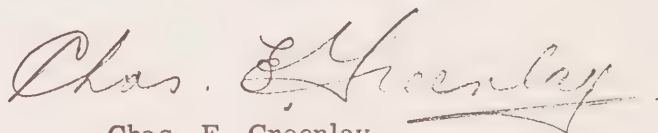
All six of the committees of the conference met at least once during the three-day session and all reports indicate that these meetings were most successful. Committee meetings, as usual, were officially "off-the-record" and no minutes were kept except on the express instructions of the committee chairman.

The results of each committee's work were outlined in its report to the Ministers. These committee reports are included in the proceedings.

The papers presented at the plenary session and special committee reports are reproduced in the Appendix to these proceedings.

At the closing plenary session Nova Scotia extended an invitation to hold next year's conference in their Province. This invitation was accepted with appreciation by the Ministers.

It is felt that the 1954 meeting held here in Winnipeg was an outstanding success and it is anticipated that the meeting in Nova Scotia in 1955 and those that come in later years will be just as successful in bringing about a better understanding between industry and government and will continue to effectively assist the progress of the mining industry in Canada.

A handwritten signature in cursive script, reading "Chas. E. Greenlay". The signature is written in dark ink and is positioned above the printed name.

Chas. E. Greenlay,

Chairman, Eleventh Annual Conference.

DATES AND PLACES
OF THE
ANNUAL CONFERENCES
OF THE
PROVINCIAL MINISTERS OF MINES

<u>CONFERENCE</u>	<u>DATES</u>	<u>PLACE</u>
First	April 14-16, 1945	Quebec, Quebec
Second	November 22-23, 1945	Toronto, Ontario
Third	September 23-27, 1946	Winnipeg, Manitoba
Fourth	September 3-5, 1947	Keltic Lodge, Nova Scotia
Fifth	September 2 - 4, 1948	Jasper, Alberta
Sixth	September 7-10, 1949	Fredericton, New Brunswick
Seventh	September 13-16, 1950	Victoria, British Columbia
Eighth	September 5-8, 1951	Saskatoon, Saskatchewan
Ninth	September 15-17, 1952	Quebec, Quebec
Tenth	September 16-18, 1953	Niagara Falls, Ontario
Eleventh	September 20-22, 1954	Winnipeg, Manitoba.

PROVINCIAL MINISTERS OF MINES AND DEPUTY MINISTERS
AT THE TIME OF THE ELEVENTH ANNUAL CONFERENCE

MINISTERS

<u>NAME</u>	<u>DEPARTMENT</u>	<u>PROVINCE</u>
Hon. F. W. Rowe	Department of Mines and Resources	Newfoundland
Hon. M. A. Patterson	Department of Mines	Nova Scotia
Hon. N. B. Buchanan	Department of Lands and Mines	New Brunswick
Hon. W. M. Cottingham	Department of Mines	Quebec
Hon. Philip T. Kelly	Department of Mines	Ontario
Hon. Chas. E. Greenlay	Department of Mines and Natural Resources	Manitoba
Hon. J. H. Brockelbank	Department of Mineral Resources	Saskatchewan
Hon. E. C. Manning	Department of Mines and Minerals	Alberta
Hon. R. E. Sommers	Department of Mines	British Columbia

DEPUTY MINISTERS

Mr. C. K. Howse.....	Newfoundland
Mr. J. P. Messervey.....	Nova Scotia
Mr. W. W. McCormack.....	New Brunswick
Dr. A. O. Dufresne.....	Quebec
Mr. H. C. Rickaby.....	Ontario
Mr. J. G. Cowan.....	Manitoba
Mr. C. A. L. Hogg.....	Saskatchewan
Mr. H. H. Somerville.....	Alberta
Dr. John F. Walker.....	British Columbia

CONFERENCE COMMITTEE

DEPARTMENT OF MINES & NATURAL RESOURCES

Chairman

Honourable Charles E. Greenlay, Minister

Deputy Chairman

J. G. Cowan, Q. C., Deputy Minister

Secretary

J. S. Richards

Committee Members

F. D. Shepherd, Mid-West Mining Association
M. J. Gobert

G. H. Charlewood
A. J. Reeve

Secretarial Staff

Miss M. Anderson, Secretary to the Minister
Miss D. Blaydon
Mrs. E. Bell
Miss E. Alexander
Miss E. Munro, Travel & Publicity

Miss T. Dunstone
Miss J. Fleming
Miss M. Green
Mrs. S. Glowienka
Miss A. Hallama

Ladies Committee

Honorary Chairman

Mrs. Chas. E. Greenlay

Mrs. J. G. Cowan
Mrs. W. G. Cowie

Chairman

Mrs. George E. Cole

Mrs. J. S. Richards
Mrs. F. D. Shepherd

LIST OF DELEGATESName of DelegateTitle or Representing

NOVA SCOTIA

Appleton, C. W.	Vice-President in Charge of Coal Sales, Dominion Steel and Coal Corporation, Ltd.
Avard, Dr. N. T.	President, Joggins Coal Company Limited, Amherst
Burchell, D. G.	Bras D'Or Coal Company Limited
Goudge, M. G.	Chief Mining Engineer, Dept. of Mines
Howland, Dr. R. D.	Chairman, Coal Policy Committee
Messervey, J. P.	Deputy Minister, Department of Mines
Miffen, S. C.	Dominion Coal Co. Ltd.
Russel, J. A.	Chief Mechanical Engineer, Dominion Steel and Coal Corporation

NEW BRUNSWICK

Clements, C. S.	Director, Mines Branch, Dept. of Lands and Mines
McNicol, W.	Fredericton
Smith, C. D.	Leadridge Mining Co.

QUEBEC

Ballachey, A. G.	Vice-President, Quebec Metal Mining Association
Beaudet, C. O.	Statistician, Dept. of Mines, Quebec
Bray, W. T.	Canadian Refractories Limited
Cottingham, Hon. W. M.	Minister, Department of Mines
Denis, B. T.	Chief, Mineral Deposits Branch, Dept. of Mines
Fairlie, J. F.	Imperial Oil Limited
Gibbs, G. H.	Quebec Asbestos Mining Association
Hutt, G. M.	Development Commissioner, C. P. R.
Jones, I. W.	Dept. of Mines

 QUEBEC cont'd

Larochelle, E.	Quebec Metal Mining Association
Little, T. E.	Quebec Mining Association
MacLean, D. M.	Director, Quebec Metal Mining Association
Nethery, T. V.	Quebec Metal Mining Association
Redpath, J. B.	Vice-Pres. Sigma Mines (Quebec) Limited
Taschereau, R. H.	Inspector of Mines, Quebec
Wiltsey, W. J.	Pres. Northwestern Quebec Prospector's Association

 ONTARIO

Arnoldi, Miss M.	Statistician, Dept. of Mines
Barrett, C. M.	Inspector of Mines
Bawden, W. E.	Chief Inspector of Mines, Dept. of Mines
Beattie, J.	Manager, Delnite Mines, and Pres. of Ontario Mining Association
Cogan, J. A.	Imperial Oil Limited
Cooper, D. F.	Mines Assessor, Dept. of Mines
Crozier, A. R.	Chairman, Ontario Fuel Board
Douglass, D. P.	Executive Officer, Dept. of Mines
Fraser, Dr. H. J.	Director, Vice-Pres. & General Manager, Falconbridge Nickel Mines
Hurst, M. E.	Provincial Geologist, Dept. of Mines
Huston, C. C.	President, Canadian Institute of Mining and Metallurgy
Jones, O.	General Manager, Consumers Gas Company
Jowsey, F. H.	Pres. God's Lake Gold Mines Limited
Kelly, Hon. P. T.	Minister of Mines
Livingstone J. G.	Imperial Oil Limited, Toronto
MacMillan, Mrs. V. R.	Pres. Prospectors and Developers Association
McFarland, J. F.	Chief, Mining Lands Branch, Dept. of Mines

 ONTARIO - cont'd

Parkinson, N. F.	Executive Director, Ontario Mining Association
Rickaby, H. C.	Deputy Minister, Dept. of Mines
Tremblay, Maurice	Toronto
Wansbrough, V. C.	Managing Director, Canadian Metal Mining Association

 MANITOBA

Brodie, J. M.	Great West Coal, Brandon
Caswell, C. F.	San Antonio Gold Mines Limited
Charlewood, G. F.	Chief Geologist, Dept. of Mines and Natural Resources
Cole, Geo. E.	Mining Engineer
Cowan, J. G.	Deputy Minister, Dept. of Mines and Natural Resources
Cowie, W. G.	Asst. Development Commissioner, Canadian Pacific Railway
Davies, J. S.	Geologist, Dept. of Mines and Natural Resources
Drybrough, John	Mining Engineer
Ewens, T.	Mines Assessor, Dept. of Mines and Natural Resources
Gamey, F. S.	Resident Engineer, Dept. of Mines and Natural Resources
Gobert, M. J.	Chief Mining Engineer, Dept. of Mines & Nat'l. Resources
Greenlay, Hon. C. E.	Minister of Mines and Natural Resources
Julmi, C.	Mines Inspector, Electrical, Dept. of Mines & Nat'l. Resources
Junker, R. H.	Mines Inspector, Dept. of Mines and Natural Resources
Lipsey, G. C.	Mgr. How Sound Exploration Company Ltd.
Milligan, G. C.	Geologist, Dept. of Mines and Natural Resources
Ostrander, L. E.	Industrial Commissioner, Canadian National Railways
Reeve, A. J.	Executive Assistant, Dept. of Mines & Natural Resources
Reynolds, G.	General Manager, San Antonio Gold Mines Limited
Richards, J. S.	Director of Mines, Dept. of Mines and Natural Resources
Shepherd, F. D.	Sec.-Treas. Mid-West Metal Mining Association

SASKATCHEWAN

Bishop, R. A.	Sohio Petroleum Company, Regina
Brockelbank, Hon. J. H.	Minister of Mineral Resources
Cawley, J. T.	Director of Petroleum & Natural Gas
Cole, D. O. Jr.	Division Land Manager, Shell Oil Company
Cruikshank, R. A.	Canadian Devonian Petroleums Limited
Cummings, J. B.	Resident Manager, Potash Co. of America
Ferguson, F. M.	Sinclair Coals Canada Ltd.
Gebhard, J. E.	Dept. of Mineral Resources
Goos, E. J.	Manager, Saskatchewan Chamber of Mines
Hawkins, G.	Royalite Oil
Hay, C.	Pres. Hi-Way Refineries Ltd.
Hogg, C. A. L.	Deputy Minister of Mineral Resources
Kamen-Kaye, M.	Principal Petroleum Geologist, Dept. of Mineral Resources, Saskatchewan
Kirk, H.	Manager, Tidewater Petroleum Limited
John, K.	Sec.-Treas. Western Dominion Coal Mines
MacNeill, J. W.	Research Economist, Dept. of Mineral Resources
McFarlane, D.	Tide Water Associated Oil
McGillivray, G. B.	Sec.-Treas. Canadian Petroleum Association
Morrice, W. A.	Hudson Bay Mining and Smelting Co., Limited
Newell, M. M.	General Manager, Charter Oil Co. Ltd.
Porter, J. W.	District Geologist, Canadian Superior Oil of California
Reynolds, E.	Examiner of Leases and Accounts Department of Mineral Resources
Sissons, G. H.	Manager, Medicine Hat Brick and Tile Co. Ltd.
Smith, D. A. G.	Chief Inspector of Mines, Dept. of Mineral Resources
Stanhope, W. R.	Land Dept., Socony Vacuum Exploration Co.
Stoneman, H. W.	District Mgr. Imperial Oil Limited

SASKATCHEWAN cont'd

Tomkins, R. V.	Director of Industrial Mineral Research, Dept. of Mineral Resources
Williams, A. J.	Assistant to Chief Oil & Gas Conservation Officer, Dept. of Mineral Resources
Wright, H. H.	Gunnar Gold Mines Limited
Wynn, A. F.	Vice-Pres. and Mgr. in Canada, Amurex Oil Development Co.

ALBERTA

Adams, C. B.	Socony Vacuum Oil
Brown, R. A. Jr.	Federal Petroleum Ltd.
Clark, H. W.	Coleman Collieries, Dept. of Mines and Minerals
Corey, B. H.	General Petroleums of Canada Ltd.
Craig, D. R.	Reservoir Engineer, Petroleum and Natural Gas Conservation Board.
Crewell, C. T.	Shell Oil Company
Dunlap, G. E.	Gen. Mgr. Sun Oil Co.
Dutton, J. A.	Director of Mines, Dept. of Mines & Minerals
Falconer, W. L.	Ponder Oils Ltd.
Funkhouser, E. M.	V. P. Woodley Canadian Oil Company
Gadbois, R. M.	Shell Oil Company, Calgary
Gillespie, B.	Canadian Petroleum Association
Harrison, R. H. C.	Pres., Canadian Petroleum Association
Jackman, C. W.	Statistician, Department of Mines and Minerals
Jacobson, A. T.	Amerada Petroleum Corporation
Knox, G. L.	President, The California Standard Company
Lang, W. A.	Research Council of Alberta
Lewis, D. E.	Law Department, Imperial Oil Limited
Loughney, E. D.	Gen. Mgr. Canadian Gulf Oil Co.

ALBERTA cont'd.

MacKenzie, W. D. C.	Division Mgr. Producing Dept., Imperial Oil Limited
MacWilliams, C.	British American Oil Company Limited
Manning, Hon. E. C.	Premier of Alberta and Minister of Mines and Minerals
Manyluk, F.	Northern Dist. Eng., Petroleum and Natural Gas Conservation Board
McKinnon, I. N.	Chairman, Petroleum and Natural Gas Conservation Board
McMullen, S. G.	Midland Coal Mining Co. Ltd.
Millard, Vernon	Secty. The Petroleum and Natural Gas Conservation Board
Patrick, J. W.	Director of Mineral Rights, Dept. of Mines and Minerals
Seibert, F. V.	Research Council of Alberta
Somerville, H. H.	Deputy Minister of Mines and Minerals
Spleth, L. M.	Phillips Petroleum Co. Calgary
Thompson, T. W. G.	Texaco Exploration Company
Vallat, E. H.	Gen. Mgr. Triad Oil Co. Ltd.
Whittaker, W. C.	Dominion Coal Board
Wilson, W.	Canmore Mines Ltd.
Work, W. A.	Asst. Land Manager, Socony-Vacuum Oil Co. of Canada Ltd.

BRITISH COLUMBIA

Ewart, T. G.	Pres. Crows Nest Pass Coal Company
Hughes, H. C.	Chief Inspector of Mines, Dept. of Mines
Lineman, J. D.	Deputy Controller, Petroleum & Natural Gas, Dept. of Mines
Mitchell, C. H.	Sec.-Treas. Mining Association of British Columbia
Morris, D. D.	Consolidated Mining & Smelting Co.
O'Brien, M. M.	Managing Director, Bralorne Mines Ltd.
Pearson, H.	Dept. of Trade and Industry

Pike, J. A.	Mgr. Island Mountain Mines Co. Ltd
Sargent, H.	Dept of Mines
Shaak, A.	Manager, Cariboo Gold Quartz Mining Co. Ltd.
Simpson, E. O. T.	Canadian Collieries (Dunsmuir) Ltd
Sommers, Hon. R. E.	Minister of Mines
Veitch, W. F.	Surveyor of Taxes
Walker, J. F.	Deputy Minister of Mines
Wallerger Mr.	Consolidated Mining and Smelting
Whisker, A.	The Argonaut Mining Co Ltd

DOMINION

Boyer, Marc	Deputy Minister of Mines & Technical Surveys
Davis, Dr. J.	Dept. of Trade and Commerce
Deir, A. R.	Dept of Trade and Commerce
Henry, R. J.	Vice-Pres. Eldorado Mining and Refining Ltd (Asst. Deputy Minister
Jackson, C. W.	(Northern Affairs and Natural Resources
O'Malley, T. M.	President, Canadian Aero-Service Limited
Powell, R. C.	Secretary, Eldorado Mining and Refining Limited
Prudham, Hon Geo.	Minister of Mines and Technical Surveys
Thomson, D. W.	Sec. to Minister of Mines and Technical Surveys
Uren, W. E	Chairman, Dominion Coal Board

SUMMARY OF PROGRAMME

Sunday, September 19th

10:00 a.m. Meeting of Interprovincial Petroleum and Natural Gas Committee
 Meeting of Statistical Committee
 1:00 p.m. to 5:00 p.m. Advance Registration
 8:00 p.m. to 10:00 p.m. Advance Registration

Monday, September 20th

9:30 a.m. to 12:30 p.m.	Registration
10:00 a.m.	Meeting of Ministers
11:00 a.m. to 12:00 noon	Plenary Session
2:30 p.m. to 5:00 p.m.	Plenary Session Continued
3:00 p.m.	Tea for ladies at the University Womens' Club. compliments of Province of Manitoba

Tuesday, September 21st

9:30 a.m. to 12:30 p.m.	Committee Meetings
11:30 a.m.	Luncheon for ladies at Lower Fort Garry: compliments of Province of Manitoba
2:30 p.m. to 5:00 p.m.	Continuation of uncompleted Committee Meetings.
6:30 p.m. to 7:30 p.m.	Reception for delegates and ladies. compliments of Mid-West Metal Mining Association
7:30 p.m. to 9:00 p.m.	Conference Dinner: Given by the Honourable Charles E Greenlay on behalf of The Department of Mines and Natural Resources

Guest Speaker

Dr H. J. Fraser, Vice-President
 Falconbridge Nickel Mines Limited

9.00 p.m.	Meeting of Ministers and Committee Chairmen
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Wednesday, September 22nd

9:30 a.m. to 10:30 a.m.	Meeting of Ministers and Committee Chairmen
10:30 a.m.	Closing Plenary Session

TECHNICAL AGENDA

Committee No. 1 - Problems Relating to Mining Operations

- (a) Reports and continuing business from 1953 Conference
- (b) Round table discussion on hoisting ropes and rope-drum ratios

Committee No. 2 - Problems Relating To Geology, Geophysics and Prospecting

- (a) Report of the Committee on uniformity in the assessment allowance for Geological and Geophysical work
- (b) Discussion of enforcement of mining claim regulations.

Committee No. 3 - Royalties, Taxation and Tariffs

- (a) Reports of Sub-Committees relative to the provincial taxation of mineral resources
Discussion in Committee of the following topics:
 - (b) Extension of three year tax exemption period for new mines when such mines are forced to close because of world metal prices.
 - (c) Import and export duties
 - (d) Severe fluctuation in metal prices
 - (e) Uranium royalty audits

Committee No. 4 - Coal

The presentation and discussion of the report of the standing committee.

Committee No. 5 - Petroleum and Natural Gas

The presentation and discussion of the report of the standing committee

Committee No. 6 - Statistical Committee

Discussion of the procedures of collecting mineral statistics and their interpretation.

FIRST PLENARY SESSION, MONDAY, SEPTEMBER 20th

A. M.

At 11:20 a m. the Honourable Charles E. Greenlay, Minister, Department of Mines and Natural Resources for the Province of Manitoba and Chairman of the Conference, called the meeting to order. He then introduced the Honourable Douglas L. Campbell, Premier of Manitoba, who offered a few words of welcome on behalf of the Government of Manitoba.

The Honourable Mr. Greenlay, in his position as Chairman of the Conference, then presented an address of welcome to the assembled delegates. At the conclusion of his address Mr. Greenlay turned the meeting over to Mr. J. G. Cowan, Deputy Minister of Mines and Natural Resources, and Deputy Chairman of the Conference, who then proceeded to outline the program planned for the three-day meeting.

At 12:00 o'clock noon the Chairman recessed the meeting until 2:30 p. m.

P. M.

The Session was resumed at 2:30 p. m. at which time the Honourable Mr. Greenlay announced that the session would be taken up with the reading of a number of papers. The following were presented:

1. "Current Trends in the Mineral Industry"-
by Dr. H. J. Fraser,
Vice-President and General Manager,
Falconbridge Nickel Mines Limited.
2. "The Problems of Mine-Making in the Far North"-
by W. H. Durrell,
General Manager,
Iron Ore Company of Canada
3. "Resources - Research - Rewards"-
by D. D. Morris,
Administrative Assistant,
The Consolidated Mining and Smelting Company
of Canada Ltd
4. "The Uranium Industry of Canada"-
by R. J. Henry,
Vice President,
Eldorado Mining and Refining Limited.
5. "The Oil and Gas Picture in Canada Today"-
by E. D. Loughney,
Vice President,
Canadian Gulf Oil Company.
6. "Canadian Coal in the Years Ahead"-
by W. E. Uren,
Chairman,
Dominion Coal Board

ADDRESS OF WELCOME

BY THE

HON. CHARLES E. GREENLAY,
CHAIRMAN OF THE CONFERENCE,
AT THE FIRST PLENARY SESSION,
MONDAY, SEPTEMBER 20th, 1954.

Fellow Ministers and Delegates.

It gives me great pleasure this morning to add my words of welcome to the Eleventh Annual Conference of the Provincial Ministers of Mines. I hope this conference will be most productive and enjoyable and, while I know the main purpose of the meeting is to discuss our mutual problems, I also hope that you will find at least a little time to sample our good Western hospitality and see something of Winnipeg and its surrounding countryside, even if it is only one of our golf courses.

On the mezzanine floor of this hotel you will find a very attractive young lady passing out the usual items of publicity for the host province, and she is also quite willing and able to supply you with any other information on places to shop, sporting events, entertainment, etc. In addition, we would like you to feel free to call on any member of the conference committee—easily identified by their blue committee ribbons -- at any time for any information or needs that you may have. It is our duty to do everything possible to make this meeting a success and we wish to help and co-operate with you in every way.

Each year finds a few new faces added to our conference and a few of the old faces departed. It is with regret that we note the passing of the Honourable C. D. French, Minister of Mines, Province of Quebec, and the Honourable W. S. Gemmell, former Minister of Mines for Ontario and later Minister of Lands and Forests for the same province.

A new-comer to our midst is the Honourable W. M. Cottingham, Minister of Mines for the Province of Quebec, and I would like to take this opportunity to welcome him to this gathering.

Unfortunately, some of our colleagues are unable to be here for this conference. The Honourable M. A. Patterson, Minister of Mines in Nova Scotia, has found it impossible to be with us in this his first year as Minister. In addition, the Honourable F. W. Rowe, Minister of Mines and Resources for Newfoundland, has also found the pressure of previous commitments too great to permit him to attend this meeting in Winnipeg.

At this, our Eleventh Annual Meeting, let us look back through the years to the beginning of this conference and follow its progress through to the present.

It was in 1944 that six of the Mines Ministers got together at a meeting of the Canadian Institute of Mining and Metallurgy in Vancouver and originated the idea of a series of conferences such as this. The idea conceived at that meeting gave birth to the first conference of Mines Ministers at Quebec in April, 1945. The Fathers of that first meeting may justly feel proud of their precocious offspring which has achieved so much in such a short period of time and, to show its precociousness is, nine years later, celebrating its eleventh birthday.

I have said the conferences have accomplished much in a few years so let us now look briefly back at some of its achievements and successes.

The conference has made possible the sharing of the experiences and achievements of all the Provinces; thus each has been able to help the other and in turn be helped. Five of the six committees which will gather tomorrow have been meeting for several years, and many worthwhile problems have been dealt with. Some of these problems have been inter-Provincial in scope and others have required the co-operation of the Federal Government in order to achieve the desired result. I believe we would all agree that the representations to the Federal authorities originating in this conference, have contributed to decisions which have been beneficial to the mineral industry. Included in the problems of this nature have been the emergency assistance to the gold mining industry, certain adjustments in tax measures, and consideration of the problems facing the coal industry. However, there are other problems which are not directly of Provincial concern and it is understandable therefore that in these instances industry may prefer to deal directly with the Federal authorities.

Some of the problems which have been considered by the various committees are of a continuing nature and consequently require either constant attention or at least periodic review. Included in this category are such things as land marred by mining operations, mine rescue work, statutes and regulations governing the acquisition of Crown mineral rights, the operation of mines, and the drilling for and production of oil and natural gas. New experiences and thoughts create new techniques and practices which necessitate a re-appraisal of these matters after they have been allowed to remain on the shelf for some time.

I believe that the representatives of industry will agree that the standing committee on petroleum (or oil as we call it in this Province) and natural gas offers a good example of the usefulness of this conference. When this committee was set up in 1949 many of the individuals in the industry, unlike most of their counterparts in the mining world, were not acquainted with the various Government officials as they were relatively new residents in this country. The problems of the industry were also new to many of the Provinces, including Manitoba. The standing committee and this conference has formed a medium for individuals, strangers a short time ago, to get together and tackle problems which are troublesome to all the Western Provinces and to a lesser degree their Eastern neighbours.

This conference has provided, and will continue to provide in the future, the same aid to newcomers in other fields of mineral endeavour.

Canada today is just entering the greatest period of expansion in its history in the fields of the extraction and processing of minerals. A quick glance at the major developments which are taking place in practically every Province across the country may serve to re-emphasize the tremendous job which lies ahead.

The huge Kitimat Project in British Columbia has now reached the producing stage. The first unit recently opened by the Duke of Edinburgh, can deliver 420,000 horsepower of electricity and will produce 91,500 tons of aluminium annually. Hydro-electric capacity eventually will be 2,240,000 horsepower, the largest ever undertaken by private enterprise. Annual aluminium production will be 550,000 tons. The project involved the labours of 10,000 men and an investment of \$275,000,000.00.

In the Yukon Territory and British Columbia a new hydro-electric and metallurgical development is being planned.

There has been an increased interest in the search for base metals in the North West Territories. The Geological Survey of Canada has made another contribution in this direction with a second great airborne survey. This summer "Operation Baker" covered 50,000 square miles in the northeastern part of the District of Keewatin.

In Alberta, oil of course continues to dominate the mineral horizon and the discovery this year of the Pembina Oil Field, among others, testifies to continued success. Construction of the Trans-Mountain Pipeline and the expansion and increased capacity of the Inter-Provincial Pipeline has improved the market situation for petroleum. The gas industry looks forward to construction of the Trans-Canada Pipeline and access to markets across Canada as far east as Montreal.

The mineral resources of both the Northern and Southern parts of Saskatchewan are attracting considerable attention. In the North, mines are being developed in what may soon be the greatest uranium producing area in the world. In the South, the search for and discovery of petroleum and gas continues unabated.

In Northern Manitoba the past year has seen completion of the railway to Lynn Lake and the beginning of shipments of nickel and copper concentrates to refineries in Alberta and Quebec. In the South, more and more oil operators are being attracted by a rapid increase in the rate of discovery and production from relatively shallow reservoirs.

In Ontario the year has been highlighted by developments in the new base metal area at Manitowadge and in the uranium-bearing areas of Blind River and Bancroft.

Quebec and Newfoundland attracted the eyes of the mining and industrial world recently on the occasion of the first shipment of iron ore from the great deposits of the Labrador Trough. This marked the beginning of the return on an investment of some \$250,000,000. Plans call for mining of 6,000,000 tons in 1955 and 10,000,000 tons in 1956. With the completion of the St. Lawrence Seaway we can foresee the delivery of 20,000,000 tons annually.

In the Maritime Provinces interest continues to be seen in base metal mine development and new discoveries of both base metals and uranium. At least one major development appears assured in New Brunswick.

I have mentioned only a few major events of the past years. Back of these is the continually expanding search for, and the mining and processing of, other metallics and industrial minerals. We have reached a scale of activity in which important events appear commonplace, and only the major events attract general public attention.

During the course of the meetings which will continue for the next three days many old problems will be revived and discussed, and many new problems will be brought to the attention of the meeting and its various committees. It is my hope that the discussions which arise from the problems presented will be as effective in producing the right answers as they have been in the past. I welcome you again to this meeting and hope that all our efforts will be crowned with success.

CLOSING PLENARY SESSION, WEDNESDAY, SEPTEMBER 22nd

At 10:30 a.m. Honourable Charles E. Greenlay called the meeting to order.

After a few opening remarks the Honourable Mr. Greenlay called upon Mr. Cowan to read the recommendations of the six committees that acted at the Conference and the action taken thereon by the Ministers.

The Chairman then announced that the Honourable M. A. Patterson had extended an invitation to hold next year's Conference in Nova Scotia. This invitation was warmly accepted by the Ministers.

The following resolutions received the unanimous and enthusiastic approval of the delegates:

RESOLVED THAT this Eleventh Conference of Provincial Ministers of Mines regrets the passing of the Honourable C. D. French and that we express to his family and to the Government of Quebec our sincere sympathy.

RESOLVED THAT the delegates express their thanks to the Mid-West Mining Association for the hospitality provided by them.

RESOLVED THAT this Eleventh Conference of Provincial Ministers of Mines regrets the absence of Dr. A. O. Dufresne on this occasion and express the hope for his rapid and complete recovery.

RESOLVED THAT the delegates express their appreciation to the Honourable Mr. Greenlay, Mr. J. G. Cowan and members of their staff for the hospitality shown to them and to the ladies and also appreciation of the good arrangements made for this conference.

The Honourable Mr. Greenlay acknowledged the thanks and appreciation extended to him and to the members of his staff. He also conveyed the appreciation of the Mines Ministers to the representatives of the industry.

The Chairman, after a few closing remarks, declared the dissolution of the Eleventh Annual Conference of the Provincial Ministers of Mines and the meeting adjourned.

COMMITTEE RECOMMENDATIONS ADOPTED
OR REPORTS ACCEPTED BY THE MINISTERS

COMMITTEE NO 1

Acting Co-Chairmen: Mr. R. H. Taschereau
Mr. W. E. Bawden

PROBLEMS RELATING TO MINING OPERATIONS

The meeting studied and discussed questions arising from the last conference

With reference to "The Fume Classification of Explosives for Use Underground", it was noted that the Federal Department of Mines and Technical Surveys has agreed to establish a classification which the provinces may put into effect.

With reference to "Gold Mines Emergency Assistance Act" (Appendix A), a resolution was submitted by the joint provincial mining associations for presentation to the Provincial Ministers of Mines regarding the need for the extension of the benefits of the act.

With reference to "Reclamation of Land Marred by Mining Operations" (Appendix B), the committee was advised that the sub-committee appointed for the study of this problem is continuing its work of compiling all data from the various provinces. A progress report for the province of Alberta was prepared by Mr. H. H. Somerville, Deputy Minister, and was presented by Mr. C. W. Jackman, Statistician, Dept. of Mines & Minerals for Alberta.

Mr. M. M. O'Brien, of British Columbia, was invited to initiate a round table discussion on hoisting ropes and rope drum ratios. Difficulties of meeting the present rules governing rope drum ratios in effect in British Columbia were discussed and comments on the matter were made by representatives of the other provinces, drawn from their experience.

A paper entitled "The Proposed Shaft Sinking System of Potash Company of America Ltd." (Appendix C), at their Saskatchewan property, was presented by Mr. D. G. Smith, Chief Inspector of Mines for Saskatchewan. Discussion of the practices to be followed was invited. Numerous questions were answered by Mr. Smith and Mr. J. B. Cummings, resident manager at the property.

A motion of thanks to Mr. Smith and Mr. Cummings, for presentation of this paper, was moved by Mr. Beatty, seconded by Mr. O'Brien, and unanimously adopted by the committee.

Mr. Wm. Simpson, Mechanical Inspector of Mines for Nova Scotia, introduced the subject of standardization in manufacture, testing and lubrication of hoisting ropes

and submitted a paper re "Standardization of Wire Rope, Tackling Equipment, their Operation and Maintenance" (Appendix D).

It was recommended that a sub-committee, consisting of chief inspectors of mines of the provinces or their representatives, be appointed to gather and exchange information on the subject.

List of members attending the meeting of the committee on "Problems Relating to Mining Operations" held at 9.30 A.M., Tuesday, September 21, 1954, at the Fort Garry Hotel, Winnipeg, Manitoba.

D. P. Douglass	Ontario
H. C. Hughes	British Columbia
M. M. O'Brien	British Columbia
A. Shaak	British Columbia
E. C. Roper	British Columbia
Wm. T. Bray	Quebec
J. Beattie	Ontario
W. A. Morrice	Saskatchewan & Manitoba
G. C. Lipsey	Manitoba
J. B. Cummings	Saskatchewan
D. G. Smith	Regina, Sask.
R. H. Junker	Winnipeg, Manitoba
W. Simpson	New Waterford, Nova Scotia
J. A. Russell	Sydney, Nova Scotia
A. G. Ballachey	Quebec
C. M. Barrett	Ontario
D. M. MacLean	Quebec
T. V. Nethery	Quebec
R. H. Taschereau	Quebec
C. W. Jackson	Saskatchewan
W. E. Bawden	Ontario
E. Larochelle	Quebec

Disposition by Ministers of Report by Committee No. 1

The report of Committee No. 1 on - Problems Relating to Mining Operations has been received and approved, including the setting up of a sub-committee consisting of the Chief Inspectors of Mines of the Provinces or their representatives, to gather and exchange information on the subject of the standardization of wire rope, tackling equipment, their operation and maintenance.

The representations from the Gold Mining Industry, as shown in Appendix A were considered and it was agreed that the following action be taken:- "with respect to the recommendation (Appendix A) regarding the Gold Mines Emergency Assistance Act the Ministers concur in the representations of the Joint Provincial Mining Association and recommend to the government of Canada the further extension of the provisions of the Gold Mines Emergency Assistance Act.

COMMITTEE NO. 2

Co-Chairmen: H. C. Rickaby
C. A. L. Hogg

PROBLEMS RELATING TO GEOLOGY, GEOPHYSICS
AND PROSPECTING

- (a) Report of the Committee on uniformity in the assessment allowance for Geological and Geophysical work.

The committee received a report on assessment work allowances for Geological and Geophysical Surveys from George E. Cole (Appendix E.)

After considerable discussion of the report the committee made the following recommendations:

- (1) The Committee recommends to the Mines Ministers that someone familiar with assessment work be employed to extend the study of all regulations in the Provinces for assessment work allowance other than those for Geological and Geophysical work.
- (2) The Committee recommends to the Mines Ministers that as a result of and concurrently with the study of assessment work regulations in the Provinces, a suggested model set of regulations be drawn up.

The question of expiry date of mining licenses across Canada was discussed, and it was recommended that:

The Committee recommends to the Mines Ministers that a comparative study be made of the claim-recording and licensing regulations in each Province, particularly regarding the expiry date of licenses, in order to consider whether uniformity could be achieved.

A motion of appreciation to Mr. G. E. Cole was approved by the Committee for the report, which will be very useful both to governments and industry.

The meeting was attended by the following:

C. A. L. Hogg	Saskatchewan
C. S. Clements	New Brunswick
E. J. Goos	Saskatchewan
Wm. J. Wiltsey	Quebec
M. E. Hurst	Ontario
H. Sargent	British Columbia
M. G. Goudge	Nova Scotia
J. R. McGinn	Ontario
J. F. McFarland	Ontario
T. M. O'Malley	Ontario
B. T. Denis	Quebec
F. H. Jowsey	Ontario
T. Stewart	Manitoba
J. F. Davies	Manitoba
G. C. Milligan	Manitoba
G. H. Charlewood	Manitoba
H. C. Rickaby	Ontario
G. E. Cole	Manitoba

Disposition by Ministers of Report by Committee No. 2

The report of the Committee as presented was approved, which included the provision to make a study toward the end of achieving uniformity of the date of expiry of mining licences in the various provinces. A Committee consisting of Mr. Rickaby, Dr. Dufresne and Dr. Walker was set up to be in charge of carrying these studies forward. This Committee was also authorized to employ personnel and make the necessary arrangements regarding remuneration.

COMMITTEE NO. 3

Co-Chairmen: Mr. N. F. Parkinson
Dr. J. F. Walker

REPORT OF COMMITTEE
ON
ROYALTIES, TAXATION AND TARIFFS

Your Committee reports that with respect to:

- (a) Reports of Sub-Committees relative to the provincial taxation of mineral resources.

We have had no reports from Sub-Committees making any specific recommendations for changes or alterations but we have had two suggestions:

1. From Saskatchewan - that the matter of Provincial taxation of minerals in relationship to Federal taxation should be referred to the Tax Foundation of Ontario for study.
2. From Manitoba - that the matters concerned should be deferred for consideration until such time as the next Federal-Provincial conference is held.

In addition, Alberta submitted a report on Royalties and Taxation of Income Derived from Mineral Production, as attached (Appendix F).

- (b) Extension of three year tax exemption period for new mines when such mines are forced to close because of world metal prices.

The Ministers should be advised for their information that the Committee felt it desirable that the question of exemption of new mines from taxation, both Federal and Provincial, not relating solely to the question of mines, reopening but comprising the whole field of the three year tax exemption for new mines, should be referred to a Sub-Committee to report back to this Committee at some convenient time for study and that accordingly a Sub-Committee comprising the following personnel has been appointed:

C. H. Mitchell
H. H. Somerville
Eric Webber
John Drybrough
Horace Fraser
Eugene Larochelle
C. S. Clements
J. P. Messervey
C. K. Howse

the co-ordinating committee of this Sub-Committee to comprise Eugene Larochelle, Horace Fraser and C. H. Mitchell.

(c) Import and export duties.

The Ministers be requested to express to the Federal Government and to the Canadian Metal Mining Association their appreciation of their actions in presenting the case of the Canadian metal producers to the United States resulting in deferment of the imposition of import duties on metals.

(d) Severe fluctuation in metal prices.

There was no resolution by the Committee.

(e) Uranium Royalty audits.

There was no resolution by the Committee.

(f) Taxation on capital gains resulting from expenditures on prospecting, exploration and development of mining properties.

It would be desirable that a special study be made of the situation pertaining to moneys expended for prospecting, exploration and development of mines with special reference to the definition of capital gains as provided for in the Federal Income Tax Act, and that a Sub-Committee be appointed for this purpose. Accordingly the following Sub-Committee was appointed:

V. C. Wansbrough

Executive Director, Canadian Metal Mining Association

J. R. Bradfield

Vice-President, Noranda Mines Ltd.

R. T. Birks

President, Howey Gold Mines Ltd.

(g) The valuation for Federal succession duties of estates containing substantial holdings of mining and exploration company securities.

For your information your Committee felt it desirable that a study of the situation should be made by a special Sub-Committee and that the Sub-Committee report back at a later date. The Sub-Committee appointed under (f) is to be requested to include this study with that pertaining to capital gains.

Submitted on behalf of the Committee.

Disposition by Ministers of Report by Committee No. 3.

The report of the Committee was received and the continuation of the Committee was approved.

COMMITTEE NO. 4

Chairman: Dr. R. D. Howland

REPORT OF THE COAL COMMITTEE
MINES MINISTERS CONFERENCE
SEPTEMBER 22, 1954.

After full consideration the following four resolutions were unanimously adopted:

RESOLUTION
FROM THE OPERATORS OF THE MARITIME COAL INDUSTRY

The Coal Mine Operators of the Maritime Provinces have recently been, and are continuing to be, confronted with increasingly serious shrinkage of markets, the trend of which, in their best judgment, indicates that by 1960 production of coal in Nova Scotia may have to be halved to some three or perhaps three and one-half million tons.

Following their policy established through the years of keeping their mining technique modernized and mechanized within the limits imposed upon them by the physical conditions under which their mining operations are carried on, they have within the past three to five years undertaken extensive programmes of betterment and improvement involving large capital expenditures. Of these, some are well in hand while work on the remainder has, recently, been either suspended or not commenced, as planned, pending reasonable certitude of the need for production capacity warranting further expenditure.

If, in the final analysis, it becomes certain that change in productive capacity is necessary and that total production must be curtailed, the operators can make such readjustments as may be required. In such event, however, they can and will no longer continue their policy of considering their operations as a whole but, because of the trend towards decreased production, they will have to abandon those collieries now maintained in operation at a loss and concentrate solely on the lower cost collieries which, none the less, have, of themselves, sufficient capacity to satisfy the foreseeable demand for Nova Scotia coal as based on the operators' present forecasts.

Understandably, the Operators are loathe to taking such steps. Indeed, such would prove to be a particularly regrettable form of readjustment (even if the only one feasible) in respect of the largest mines in Canada, namely, those in Cape Breton, N.S., for, being extensively submarine and, therefore, not susceptible to long-term, though perhaps temporary, shut-down pending hoped-for improvement in markets, the closure of any one or more of these mines must be permanent and result in the irretrievable loss of valuable natural resources to the Province of Nova Scotia, to the economy of which the Coal Industry contributes greatly, and in which it plays a highly significant part. It would be ruinous to a number of towns and villages situate within the mining

areas to a degree from which they could never recover and large numbers of workmen, both mine employees and others, would be thrown out of employment.

The disastrous effect of such a forced move on the general economy would extend much further afield; not an area within the Maritime Provinces but would be affected and, resulting, therefrom, it would be detrimental to the economy of the nation.

That being so - as, otherwise, cannot successfully be contended - it is submitted that the Maritime Coal Industry is a national asset and that, in time of war, it becomes an essential to national security, for no war effort could be maintained in the East without ample supplies of coal as a source of needed industrial power. Translated into other terms, this industry, therefore, cannot be regarded as other than an integral part of plans for National Defence.

In this reference it must be borne in mind that importation of coal is available to Canada only after the requirements of producer nations have first been satisfied and that all oil available to Eastern Canada is also in the category of being an import, with the further certainty that, in the event of war, large quantities will be diverted to other areas in urgent need and the additional obstacle to the Canadian defence effort that such oil as may be apportioned to Canada, being water-borne, must become subject to the commandeering of shipping and the perils of naval warfare. Surmounting all, it must be recognized that if supplies of imported coal or alternate fuels are interrupted or cut off by war, it will be most difficult - and, in respect of the submarine mines of Nova Scotia, quite impossible - to replace them from Canadian mines which may have been forced to close.

The invidious position in which the Maritime Coal Operator finds himself is therefore obvious; he must, in the interests of all concerned, avoid the shutting down of mines and the abandoning of undeveloped coal areas tributary thereto if at all possible; he cannot afford or justify continuation of heavy expenditures for improvements in production without reasonable assurance that these improvements will be made use of with, through available markets, commensurate returns on risk capital; he appreciates the importance of his own industry to community and provincial economy and as a national asset; he lacks knowledge as to what policy Government intends to pursue in respect of the Coal Industry and, without that knowledge, it is impossible for him to undertake long-term planning or proceed with certain improvements already in hand or proposed. His policy cannot be determined of itself for it is inevitably tied to that of Government in respect of Coal as it affects the general economy and especially so in its aspect of being an essential to national defence in time of war.

THE MARITIME COAL INDUSTRY, THEREFORE, AND IN THIS IT IS WHOLEHEARTEDLY SUPPORTED BY THE GOVERNMENTS OF NOVA SCOTIA AND OF NEW BRUNSWICK, REQUESTS THAT THIS CONFERENCE OF PROVINCIAL MINISTERS OF MINES STRONGLY URGE THAT THE GOVERNMENT OF CANADA, IN CONSULTATION WITH ITS DEPARTMENT OF NATIONAL DEFENCE AND ITS DEPARTMENT OF MINES AND TECHNICAL SURVEYS, ASSESS THE VALUE OF THAT INDUSTRY AS A NATIONAL ASSET NECESSARY TO THE DEFENCE OF THE NATION AND, WITHOUT UNDUE DELAY, ANNOUNCE ITS DECISION THEREON. WE REAFFIRM OUR CONVICTION THAT A SUBSTANTIAL AND PROSPEROUS COAL INDUSTRY IN THE MARITIME PROVINCES IS ESSENTIAL TO THE WELL BEING AND DEFENCE OF CANADA.

RESOLUTION OF THE WESTERN COAL INDUSTRY

During the past three years the overall coal production in Alberta and British Columbia has declined by 40 per cent, while underground production has been cut in half in the same period.

The first seven months of 1954 has seen the closure and abandonment of some 58 mines both large and small and there is every indication that there will be further large scale closures and abandonments in the coming months.

The recently authorized gas pipeline to Eastern Canada will reduce substantially the market for Western coal in the Prairie Provinces and Ontario while the projected gas line to the Pacific Coast will, when constructed, make serious inroads into the Interior and Coastal coal markets of British Columbia.

All of the foregoing together with the increasing competition of fuel oil and propane will have disastrous effect on the Domestic Coal Industry and to a lesser extent on the Bituminous mines.

The Canadian National Railway Company, have, within the past month, completely discontinued the purchase of locomotive fuel in Western Canada. When existing stock-piles have been consumed during the balance of the year, this Railroad will be operating exclusively with oil fired and diesel locomotives on Western lines.

Sales to the Canadian Pacific Railway have also declined during the past year by more than 25 per cent and further dieselization of this road is indicated in the future.

Under these circumstances it is inevitable that more mines will close, more mine workers will lose their employment, more communities will be turned into ghost towns and more coal reserves will be lost by closure and abandonment.

In total the Industry, its workmen and those other persons whose livelihood depends directly and indirectly on its continuance are faced with confusion, doubt and uncertainty as to the future.

It is the feeling of the Industry and of all those connected with it that Western coal has a definite place in the economy of Canada and that it should continue to function at such level that it will be able to meet all of the future foreseeable demands made on it by the Nation under any circumstance which may arise.

However, to continue to operate at the above level a definite overall volume is required to maintain it to the degree where it can function with efficiency. In this connection we wish to emphasize that no industry can be reduced to a complete skeleton of its former self without serious impairment to its every segment rather than just to its weaker parts.

In its latest Annual Report the Dominion Coal Board has stated that the Western Coal Industry is vital to the economy of the Nation and has recommended that the present level of subvention assistance to the Industry be continued. The question, however, must be faced as to whether the present level of assistance is adequate or even effective and whether such assistance is to be considered a maximum.

In this connection it may be pointed out that present assistance to the industry is confined to a 50¢ duty on American Bituminous Coal and freight subventions to

Ontario which approximate only 5 percent of the retail sales value of the product. In contrast it is noted that certain other industries considered vital to Canada receive assistance and protection to a much greater extent.

Finally we believe that in view of the present catastrophic situation and the completely bleak outlook which faces the industry it is now necessary that the Federal Government issue, without delay, a clear cut statement as to whether it is prepared to see the industry completely destroyed, which will surely be the case unless some immediate action is taken or is prepared to take such steps as are necessary to enable it to continue to function at a level at which it has a reasonable opportunity to function on an economic and efficient basis.

THE WESTERN COAL INDUSTRY, THEREFORE, REQUESTS THE HONOURABLE MINISTERS HERE ASSEMBLED TO REAFFIRM THEIR SUPPORT OF THE VIEWS EXPRESSED HEREIN AND TO PRESENT THESE AT THE EARLIEST POSSIBLE DATE TO THE FEDERAL GOVERNMENT FOR THEIR IMMEDIATE ASSESSMENT AND DECISION.

RESOLUTION ON COAL FIRED GAS TURBINE LOCOMOTIVE

The delegates to the 6th Annual Conference on Coal Research which was widely attended by leaders of the Canadian Coal Industry and the power generating industry of Western Canada, unanimously supported the resolution appearing below regarding the coal fired gas turbine locomotive.

Prof. Mordell's experimental work has met with outstanding success. Our advise from competent authorities including Dr. A. G. Christie, Prof Emeritus of Mechanical Engineering of John Hopkins University, is that in this invention Canada has gained a leading position relative to developments elsewhere. The work is at the stage when it is vital to proceed to a prototype locomotive.

It should be noted that the United States railways, which have more fully adopted the diesel locomotive, are anxiously looking to the gas turbine as an alternative to the diesel, and are now playing a leading role in support of the development of a somewhat similar but possibly inferior coal fired gas turbine locomotive.

In view of the above and of the highly significant markets for coal, which are associated with railway transportation, it is requested that the Ministers of Mines support the following resolution with emphasis on the total and complete direction of the project toward the development of a railway locomotive, rather than any other form of application.

THE CANADIAN COAL INDUSTRY REQUESTS THE MINISTERS OF MINES TO URGE UPON THE GOVERNMENT OF CANADA THE DESIRABILITY AND NECESSITY OF ARRANGING FOR THE CONSTRUCTION AND TESTING OF A PROTOTYPE COAL FIRED GAS TURBINE LOCOMOTIVE AND FURTHER; TO IMPRESS UPON THE GOVERNMENT OF CANADA THAT IN THE INTERESTS OF BOTH NATIONAL PRESTIGE AND ECONOMY SUCH ACTION BE TAKEN WITHOUT DELAY.

RESOLUTION REGARDING AN ENERGY BUREAU

Immediately preceeding this Provincial Mines Ministers Conference, the Dominion Provincial Coal Research Conference held a highly successful symposium on energy requirements at which were present executives representing major power companies, coal producers, atomic energy and representatives of Dominion and Provincial Governments. The papers and discussions proved most informative and practical, but demonstrated the lack of statistical and overall information on anything but a local basis.

It was clearly apparent, however, that the facts with respect to energy sources and energy requirements should be ascertained and continuously observed, in view of the vital importance of adequate energy for Canada's industrial development and national security and the high level policy decisions that current developments are requiring.

THEREFORE BE IT RESOLVED THAT THIS COAL POLICY COMMITTEE REQUESTS THAT THE MINISTERS OF MINES RECOMMEND TO THE GOVERNMENT OF CANADA THAT IT CREATE A BUREAU OF RECOGNIZED STATURE TO COLLECT ALL INFORMATION AND STUDY PROBLEMS RELATING TO ENERGY SOURCES AND REQUIREMENTS ON A NATIONAL BASIS BUT WITH DUE REGARD TO REGIONAL PROBLEMS.

Disposition by Ministers of Report by Committee No. 4

The Report of the Committee was received and the following Resolutions approved and adopted:

RESOLUTION NO. 1 FROM THE OPERATORS OF THE MARITIME COAL INDUSTRY

The Maritime coal industry, therefore, and in this it is whole-heartedly supported by the Governments of Nova Scotia and of New Brunswick, requests that this Conference of Provincial Ministers of Mines strongly urge that the Government of Canada, in consultation with its Department of National Defence and its Department of Mines and Technical Surveys, assess the value of that industry as a national asset necessary to the defence of the nation and, without undue delay, announce its decision thereon. We reaffirm our conviction that a substantial and prosperous coal industry in the Maritime Provinces is essential to the well-being and defence of Canada.

RESOLUTION NO. 2 FROM THE WESTERN COAL INDUSTRY

The Western Coal Industry, therefore, requests the Honourable Ministers here assembled to reaffirm their support of the views expressed herein and to present these at the earliest possible date to the Federal Government for their immediate assessment and decision.

RESOLUTION NO. 3 WITH REGARD TO COAL-FIRED GAS TURBINE LOCOMOTIVE

The Canadian Coal Industry requests the Ministers of Mines to urge upon the Government of Canada the desirability and necessity of arranging for the construction and testing of a prototype coal-fired gas turbine locomotive and, further, to impress upon the Government of Canada that in the interests of both national prestige and economy such action be taken without delay.

RESOLUTION NO. 4 REGARDING THE SETTING UP OF AN ENERGY BUREAU.

Therefore be it resolved that this coal policy committee requests that the Ministers of Mines recommend to the Government of Canada that it create a bureau of recognized stature to collect all information and study problems relating to energy sources and requirements on a national basis but with due regard to regional problems.

COMMITTEE NO. 5

Co-Chairmen: H. H. Somerville
I. N. McKinnon

PETROLEUM AND NATURAL GAS

Committee meetings were held during the year on June 25th and September 19th, and 21st.

Sub-Committees

In accordance with the recommendation approved by the Mines Ministers at the Niagara Falls meeting, the following sub-committees have been established:

1. Regulatory Practices.
2. Conservation.
3. Oil and Gas Rights.
4. Legal.

The Regulatory Practices Sub-Committee reported that all the drilling and production regulations pertaining to Canada and the United States have been gathered and that the committee will now proceed with the drafting of a model set of drilling and production regulations which should be completed by the next Mines Ministers' meeting.

The Conservation Sub-Committee presented a comprehensive survey of the availability of reservoir data. This report was adopted by the Committee and it was decided to distribute it to industry through the facilities of the Canadian Petroleum Association. The Sub-Committee was also asked to revise the data contained in the survey as changes occur. A copy of this report is appended hereto. (Appendix "G")

The Conservation Sub-Committee also reported that three working committees had been formed to study special problems contained in the original terms of reference for the Sub-Committee. These projects are:

1. Well spacing.
2. Allowables.
3. Salt water disposal.

The newly appointed chairman of the Oil and Gas Rights Sub-Committee sought advice regarding the terms of reference for his group. It was agreed that the Sub-Committee should revise the Model Act with respect to:

1. Disposal of oil and gas rights.
2. Acquisition of Right of Entry.
3. Regulation of geophysical exploration as it pertains to the surface. (It was agreed that regulations concerning sub-surface operations should be dealt with by the Regulatory Practices Sub-Committee.)

The Legal Sub-Committee, in addition to drafting into legal form the Model Act and regulations for the other three Sub-Committees, was asked to study legal problems regarding the pooling of interests in spacing units, the unitization of oil and gas pools and secondary recovery. The Sub-Committee was instructed to collaborate with the Legal Committee of the Canadian Petroleum Association which is also studying these subjects.

Statistical Report

The Statistical Report, (Appendix H) presented to the Committee by the Secretary, was approved with the recommendation that it be appended to the report of the Mines Ministers.

Legislation

During the year the Committee reviewed the new legislation enacted by the various provinces since the last meeting at Niagara. This includes:

- | | |
|---|------------------|
| 1. The Ontario Fuel Board Act | Ontario |
| 2. Pipe Line Act | Manitoba |
| 3. Mineral Taxation Act | Manitoba |
| 4. Pipe Line Act | Saskatchewan |
| 5. Petroleum and Natural Gas Act, 1954 | British Columbia |
| 6. Regulations made under the Petroleum and Natural Gas Act, 1954 | British Columbia |

General

The Committee decided to hold its next meeting in April to hear reports from the four Sub-Committees and to consider the Committee's agenda for the next Mines Ministers' meeting. It was further agreed that in preparing the agenda for the next Mines Ministers' meeting that arrangements be made to have speakers present papers and lead discussions on subjects of special interest.

An invitation was extended to the Mines' Department of each Province and to members of industry to submit at any time for consideration by the Committee any problem pertaining to oil and gas that may arise during the ensuing year.

Recommendations

Concluding the deliberations of the meeting held at the Conference, the Inter-provincial Petroleum and Natural Gas Committee adopted the following recommendation, which is respectfully submitted to the Mines Ministers for approval:

The Committee recommends that the Interprovincial Petroleum and Natural Gas Committee continue as a standing committee with the services of a permanent secretary.

Members of the Interprovincial Petroleum and Natural Gas Committee for the 1954 term are as follows:

INTERPROVINCIAL PETROLEUM AND NATURAL GAS COMMITTEE STANDING COMMITTEE

Co-Chairmen - H. H. Somerville
I. N. McKinnon

Secretary - V. Millard

Industry Representatives

R. A. Bishop
R. A. Gruickshank
G. E. Dunlap
J. F. Fairlie
E. D. Loughney
S. B. Severson
R. H. C. Harrison
E. H. Vallat

Government Representatives

J. D. Lincham
J. T. Cawley
J. S. Richards
A. R. Crozier
I. W. Jones
C. S. Clements
M. G. Goudge

SUB-COMMITTEES

	<u>Regulatory Practices</u>	<u>Conservation</u>	<u>Oil and Gas Rights</u>	<u>Legal</u>
Chairmen	F. Manyluk	A. Williams	J. S. Richards	N. A. MacLeod
Members	M. Kaymen-Kaye M. J. Gobert E. C. Babson	D. R. Craig M. J. Gobert E. H. Vallat	J. D. Lineham J. W. Patrick A. R. Dahl A. R. Crozier W. N. Graburn R. A. Bishop D. M. Johnson D. E. Lewis S. B. Severson	J. Gebhard C. MacWilliams

Disposition by Ministers of Report by Committee No. 5

The Report of Committee No. 5 on Petroleum and Natural Gas, under the chairmanship of Mr. H. H. Somerville and Mr. I. N. McKinnon was received and adopted, and the Committee authorized to continue, and the following recommendation of the Committee was approved. "The Committee recommends that the Interprovincial Petroleum and Natural Gas Committee continue as a standing committee with the services of a permanent secretary."

COMMITTEE NO. 6

Chairman: Herbert Pearson

REPORT OF THE STATISTICAL COMMITTEE

The following Mining Statisticians attended:

Miss M. G. Arnoldi	Province of Ontario
Mr. C. W. Jackman	Province of Alberta
Mr. T. Ewens	Province of Manitoba
Mr. C. O. Beaudet	Province of Quebec
Mr. H. Pearson, Chairman	Province of British Columbia

Mr. A. R. Deir, Chief, Minerals Statistics Branch, Bureau of Statistics, Ottawa, attended in his capacity as liaison officer between the above-named statisticians and his Ottawa office.

Two sessions of the Committee were held, September 19 and September 21.

Comprehensive reviews of the procedures followed were given by the respective members. Metal production statistics, as well as those for structural materials, and industrial minerals, were reviewed.

It is considered that there are some minor differences of interpretation as between one Province and another, but, in general, local conditions may be the cause, and, in the main, do not amount to any serious figure.

Coal and petroleum statistics were not dealt with only in general reference terms. However, your Committee was gratified by the short visit of Mr. I. N. McKinnon, chairman, The Petroleum and Natural Gas Conservation Board, Calgary, Alberta, and Mr. V. Millard, secretary of such Board, who offered assistance to your Committee of dealing with the collection and compilation of petroleum and natural gas statistics. This was also tendered to Mr. Deir in a conversation the two gentlemen had previously.

Your Committee is sincere in emphasizing that the most cordial and effective relations do exist Provincially and with the Bureau of Statistics in the collection on a cooperative basis of mineral production statistics. Further, there have been no serious complaints to record of industry complaining of the necessity of providing such information when called on to do so. This may be interpreted as an indication of the usefulness of the material collected, and with the minimum of annoyance.

Your Committee is further proud that the collection of mineral production statistics, by the Provincial Statisticians and the Ottawa Bureau of Statistics, has reached the position that, when the question of a new phase or a corrective one in a statistical problem arises, it is speedily and satisfactorily disposed of by correspondence.

The value to the individual in being privileged to meet his fellow mining statisticians has been most useful, and the courtesy of the Mines Ministers' Conference is gratefully acknowledged, and perhaps may again be so extended in the future.

The Committee was happy to receive calls from the following-named gentlemen, who courteously offered suggestions and comments during the visit:

Mr. I. N. McKinnon, chairman, The Petroleum and Natural Gas Conservation Board, Calgary, Alberta;

Mr. Vernon Millard, secretary, The Petroleum and Natural Gas Conservation Board, Calgary, Alberta;

Mr. E. Larochelle, secretary, Quebec Metal Mining Association, Quebec;

Mr. A. G. Ballachey, vice-president, Quebec Metal Mining Association, Quebec;

Mr. G. B. McGillivray, secretary-treasurer, Canadian Petroleum Association, Regina, Saskatchewan.

Respectfully submitted.

Disposition by Ministers of Report by Committee No. 6

The Report of Committee No. 6, the Statistical Committee under the chairmanship of Mr. Herbert Pearson was received.

The Conference was pleased to note the most cordial and effective relations which exist between the Provinces and the Bureau of Statistics in connection with the collection of important and vital information.

APPENDIX - "A"

RESOLUTION

by the

Joint Provincial Mining Associations
for presentation to the Provincial
Ministers of Mines at their Eleventh
Annual Conference regarding the need
for the extension of the benefits

of the

"Emergency Gold Mining Assistance Act"

presented by

F. D. Shepherd, Secretary

Joint Provincial Mining Association of Canada

WHEREAS the report on the administration of the Emergency Gold Mining Assistance Act for the fiscal year ended March 31, 1954, as issued by the Department of Mines and Technical Surveys, shows that 25 lode gold mines or 42 per cent of all those for which returns at that time were available and which produced 23 per cent of the total gold produced by lode mines had costs of \$35.00 per ounce or more; and

WHEREAS at the current official price for gold, which approximates \$34.00 per ounce, it is obvious that all or a great majority of those mines would be unable to continue to operate without Government assistance, thus causing a severe loss to Canada immediately of a source of monetary gold readily available in return for Canadian dollars; and

WHEREAS it is further apparent from a perusal of similar reports for previous years that more and more of the lode gold mines each year are being forced, first into the higher cost brackets and eventually out of production entirely even with the aid of assistance, which procedure will, in the course of time, accentuate loss of monetary gold from Canadian production; and

WHEREAS many Canadian gold mines and their dependent communities have been able to continue existence only as a result of the valued aid rendered by the Government of Canada under the terms of the Emergency Gold Mining Assistance Act; and

WHEREAS operating costs, including labour, equipment and supplies, have continued (and are continuing) to increase steadily during the period in which the Act has been effective; and

WHEREAS the operators of Canadian gold mines have as yet received no official confirmation that the benefits of this most valued Act will be extended beyond the end of the current year; and

WHEREAS the Joint Provincial Mining Association comprises all Provincial Canadian Mining Associations whose membership includes all gold operations;

NOW THEREFORE BE IT RESOLVED that the Joint Provincial Mining Associations of Canada, take this means to inform the Provincial Ministers of Mines or their representatives assembled at this Conference, of the difficulties confronting the Canadian gold mining industry and the vital need for the extension of this most important legislation.

APPENDIX - "B"

PROGRESS REPORT

of the

PROVINCE OF ALBERTA

"RECLAMATION OF LAND MARRED BY MINING OPERATIONS"

General Information

The strip coal mines in Alberta are located in four geographical areas that govern for the most part their problems as respecting the reclamation of lands marred by their strip mining activity. The marred land consists mainly of waste dumps or spoil piles which result from removal of the overburden to get the coal.

The four geographical areas are;

1. The Southern Area.
2. The Central Area.
3. The Northern Area.
4. The Foothills Area.

1. The Southern Area - There is very little rainfall in the localities where the mines occur and for the most part the land will not grow any cultivated crops except where it is irrigated. Natural vegetation consists of Russian thistle, wild mustard and foxtail.

The mine operators use the tractor and scraper method of stripping and the spoil dumps are left reasonably level. Shale from the top of the coal is left on top of the dumps and in most cases the hot dry climate stops the growth of any vegetation on these dumps.

The reclamation program at these mines has been on an experimental basis and shows a slight possibility of success. To date in this area these mines have stripped 180 acres of land and seeded back 36 acres with very slight success, even though the last two years were considered to have above normal rainfall.

The method used is to broadcast the grass and clover seed by means of a hand fan type seeder on the spoil piles in May or June. However, considering that in these localities nothing will grow without irrigation, it is not reasonable to expect great results from these efforts to plant grass on the spoil piles.

2. The Central Area - Most of the land in the neighborhood of the mines is used for pasture because of the soil consisting mainly of heavy clay.

The mine companies strip the overburden off the coal by means of large power shovels and draglines. In the course of the stripping operation the dumps are left quite rough and uneven, and would require additional expensive work to level them out.

The method of reclaiming this land has been subject to much discussion but the operators, particularly in the Battle River Area, have found that they get greater success by hand seeding the rough spoil piles with a mixture of grass and clover, with about 15 to 20 pounds of seed per acre.

In this area the seed will not catch on the compacted spoil piles that have been levelled by tractor and scraper. This is due to the fact that the heavy clay becomes a hard pan when compacted, and is impervious, thus it will not weather and become a seed bed. However, the rough spoil piles are loose and weather well, making a good seed bed for the grass and clover sown, resulting in very good catch after three years.

In this area a total of 201 acres have been stripped and 168 acres have been seeded down with varying success. The test plots to date seem to indicate greater success can be expected from the seed that is sown on the rough, unlevelled, uncompacted spoil piles because of the nature of the soil itself.

3. The Northern Area - The climate and soil in this area seems to be more favourable to growth of plants, with the result that it is this area that we find the greatest success in reclamation of areas marred by strip mining operations.

The mines all use the tractor and scraper method of uncovering their coal, resulting in spoil dumps that are gently rolling, with small water holes for watering cattle.

The soil itself is a sandy clay that is reasonably loose and is seeded down by a hand farm type seeder. Grass, clovers and crested wheat are sown without any soil preparation, and usually make a good catch, particularly in wet years.

In this area a total of 194 acres have been marred by stripping, and to date 181 acres of this has been seeded back to pasture, and 35 acres of this is now being used for pasture for cattle.

4. The Foothills Area - The surface topography of this area is very irregular. The strip mine operators are not required to level spoil dumps which usually consist of rock and waste coal. They are, however, required to provide suitable drainage facilities so that water will not accumulate in the pits.

Summary of Reclamation Progress

Strip Coal Mines

No estimate has been made of the acreage involved in pits and spoil piles in the foothills area but the following statistics indicate the progress that has been made in the field of reclamation by the operators of strips coal mines in the other areas of the Province since 1952.

	Before 1952	1952	1953	1954	Total
Acreage stripped	264	96	113	102	575
Acreage seeded		153	108	124	385

Other Strip Mines

The limestone and shale quarries of the Province are located in mountainous areas rendering reclamation impossible and reclamation is not a problem at the small bentonite quarry as the deposit occurs only a short depth below the surface.

APPENDIX - "D"

NOTES RE: STANDARDIZATION OF WIRE ROPE, TACKLING EQUIPMENT, THEIR OPERATION AND MAINTENANCE

presented by

W. Simpson

Mechanical Inspector of Mines

Nova Scotia Department of Mines

The need for standard equipment also standard methods of inspection, testing and maintaining it has been considered necessary for many years. The need was most apparent during the war years and would have continued to grow worse had it not been for our educational and standardization program which was inaugurated at that time by the Nova Scotia Department of Mines in conjunction with the Nova Scotia Research Foundation and the Dominion Steel & Coal Corporation. This program is continuing very efficiently and has been instrumental in setting up a Provincial and Regional Rope Committees, the standardization of rope socketing, improved legislation regarding the inspection and maintenance of all mechanical equipment and the procuring and developing of the best scientific equipment for the testing and inspecting of mechanical equipment while in operation.

Our educational program consists of instructing and demonstrating to inspectors or mechanical equipment in the mines new techniques and devices for the inspection and maintenance of their equipment. The practical application of non-destructive testing methods leads the program. The devices used to date are:

- (1) An Electronic Rope Tester to measure total stress in the rope while it is in operation.
- (2) Ultrasonic Reflectoscope to locate flaws in shafts and castings.
- (3) Penetrant dyes to detect surface flaws in small castings, couplings, etc.
- (4) Stress coat to check equipment to see if it is properly designed.
- (5) An Electronic Lay Length Recorder to measure the length of each rope lay while the rope is hauling the normal load.

Other equipment used:

- (1) Running Dynamometer to determine the static and dynamic loads on wire rope and tackling equipment while in operation.
- (2) Wire Rope Lubricator to clean the rope and oil it.
- (3) A Portable Destructive Testing Machine used to prove the efficiency of rope socketing.

This equipment and all the equipment listed above is transported from mine to mine in a specially designed mobile testing lab.

The experience gained by our educational program indicated the need of standardizing of material and their uses also their maintenance and inspection. To facilitate their work it is necessary that we work with standard products and we recommend that:

(1) The Manufacturers of wire ropes supply a product of a specified tolerance similar to that described in the British Standard Specifications, No. 330, of 1941, with up-to-date ratifications.

(2) Wire rope used for hoisting men or minerals should be removed from service when the breaking strength at the socket end has decreased 15% of its original strength.

(3) No wire rope shall be stored at a mine unless in a place specially designed and equipped to protect it from moisture and excessive heat.

(4) No lubricant shall be used on wire ropes unless it protects the rope from accelerated abrasion and from corrosive influence of the elements. It should eventually penetrate the rope and still have the ability not to harden, flake off or wash off. It should contain adhesiveness and cohesiveness qualities, wetting and penetrating qualities, rust prevention characteristics, extreme pressure characteristics, flexibility at wide range of temperature - 30° F and 150° F.

(5) That a Committee be appointed to review all the Research Work that is being done on wire rope throughout all the provinces for the purpose of evaluating and preventing duplication.

SHAFT HOIST

COLLIERY	ROPE SHEAVE RATIO	ROPE DRUM RATIO	AVERAGE ROPE LIFE
Princess - coal	122	157	2 1/2 yrs
men	96	114	2 yrs.
No. 12 - airshaft	72	72	3 yrs.
No. 1B - coal	96	108 & 72	1 yr.
- men	60	60	3 yrs.
No. 2 - coal	89	89	1 1/2 yrs.
- men	89	89	1 1/2 yrs.
No. 4 - coal	115	76	1 yr.
- men	76	76	1 1/2 yrs.
- airshaft	96	58	
Allen	96	72	2 yrs.
Max. Ratio	122	157	3 yrs.
Min. Ratio	60	58	1 yr.

AUXILIARY SLOPE HOIST UNDERGROUND

COLLIERY	ROPE DRUM RATIO	AVERAGE LIFE
Princess - man	96	1 1/3 yrs
No. 12 - coal	77	1 yr.
- men	44	2 yrs.
No. 16 - coal	77	7 mos.
- men	36	7 mos.
No. 1B - 5 deep coal	77	9 mos.
Springhill #2 - aux.	72	1 yr.
#4 Aux.	61	1 yr.
	Max. Ratio 96	2 yrs.
	Min. " 36	7 mos.

SURFACE SLOPE HOIST

<u>COLLIERY</u>	<u>ROPE SHEAVE RATIO</u>	<u>ROPE DRUM RATIO</u>	<u>AVERAGE ROPE LIFE</u>
Endless Haulage			
Florence - Coal	58	82	1 yr.
- Men	72	96	1 3/4 yr.
No. 18 - Coal	58	85	8 mos.
No. 12 - Coal	85	85	10 mos.
- Men	72	60	2 yrs.
No. 16 - Coal	64	85	7 mos.
- Men	42	96	2 yrs.
McBean	65	65	1 yr.
Albion	64	74	3 yrs.
MacGregor		90	1 yr.
Drummond No. 1	48	85	1 yr.
No. 2	48	85	1 yr.
Springhill No. 2	52	70	1 yr.
No. 4	52	61	1 yr.
Riding Slope	72	168	1 yr.
Max. Ratio	85	168	3 yrs.
Min. Ratio	42	60	7 mos.

APPENDIX - "E"

REPORT ON ASSESSMENT WORK ALLOWANCES

FOR GEOLOGICAL AND GEOPHYSICAL SURVEYS TO THE

STANDING COMMITTEE ON MINES, MINERALS AND MINING RIGHTS

by

Geo. E. Cole

Directive for 1954

At the Tenth Annual Conference of the Provincial Ministers' of Mines of Canada held at Niagara Falls, Ont., September, 1953, the Standing Committee on "Mines, Minerals and Mining Rights" set out the following directive for the collation of material for the Eleventh Conference to be held at Winnipeg, Man, 1954.

1. A complete review in tabulated form of existing legislation of
the provinces of Canada covering assessment work allowances -
in metal mining;
2. And, upon completion of that task to decide upon the next step
to be taken - with particular reference to assessment work
allowances for geological, geophysical (ground and airborne)
surveys.

Tentatively it was agreed that the Committee would discuss matters at the 1954 Annual Meeting of the Canadian Institute of Mining and Metallurgy at Montreal.

Meeting of Standing Committee

A tabulation of the existing regulations was presented to Messrs. A. O. Dufresne and H. C. Rickaby of the Standing Committee at the Montreal Meeting, April 27. The tabulation set out a comparison by provinces of such matters as -

1. Cost of miner's license
2. Size and form of mineral claims
3. Number of claims permitted each year
4. Time to record after staking
5. Assessment period
6. Assessment requirements
7. Number of claims grouped
8. Payments in lieu of work
9. Rental
10. Final Title
11. Geological and Geophysical Surveys.

More Details Desirable

The chart compared for comparison was studied carefully and it was decided that the collation covering geological and geophysical surveys was not sufficient in detail to present a clear comparison of the legislation affecting these surveys when presented to the several departments of mines for assessment (representation) work. Before proceeding to the collation of legislation covering these surveys it would be well to point out that in the legislation covering assessment work there is a great lack of uniformity.

More Uniformity Being Attained

Coming now to the collation of legislative and administrative requirements for the submission of geological and geophysical surveys which are being presented to the Eleventh Annual Conference of Provincial Ministers of Mines, it may be said there is a commendable similarity in the legislation and administration of all mining provinces in Canada. The general principles involved are the same even if there is some diversity in the details of administration.

Competent Conduct of Surveys

It should be noted that in several provinces power is given to the Minister or a Senior Official to handle many details that would otherwise clutter up an Act or add to the reading and assimilating of the many legal requirements. Generally speaking the provincial departments of mines have given to the mining fraternity that consideration which is conducive to co-operation. At the same time it is recognized that the competent conduct of a geological or geophysical survey is something which can only be entrusted to highly skilled and well-trained workers.

Progress in Prospecting

Prospecting in modern times has advanced a long way from the pick, shovel and hand-drill methods of other days. The highly technical methods of today are evidence of the fact that science has come to the aid of the prospector yet this demands safeguards to protect the public domain in the intensive development that is now being pursued. Hence the careful scrutiny that should be, and is, given to maps, plans and reports which are required by the departments of mines.

Recognized Methods

It will be noted that there is unanimity in what are the recognized methods of geophysical surveying that may be allowed as assessment work, i. e. magnetic, electric, electro-magnetic, gravimetric, seismic and radio-active. And geological examination must go hand in hand with the geophysical survey.

Some Specials

Attention is directed to page 6 of the collation where "Special" consideration is given to "Airborne Geophysical Investigations and Geophysical Reservations" of Manitoba and to "Geophysical Prospecting License" of Ontario.

Arrangement Adopted

The arrangement adopted in the collation begins with British Columbia on the west and carried on to Ontario and Quebec on the East. These three provinces have the most extensive requirements and instructions for geological and geophysical surveying allowed for assessment work. The other provinces follow in order from Alberta to Newfoundland. And, the requirements of the Yukon Quartz Mining Act and The Quartz Mining Regulations of the Northwest Territories affecting geological investigations, are included.

Adherence to Requirements

While material in the collation has been gleaned from the acts and regulations of the Canadian provinces, there is much included which comes from instructions given out, and "adherence to the . . . requirements will facilitate the confirmation of assessment work credits for geological and geophysical surveys."

CONCLUSION

The collation of the material covering assessment work allowances for geological and geophysical surveys is attached to this report.

BRITISH COLUMBIAASSESSMENT WORK ACCEPTED

Under authority of Orders in Council 1530/48, 1532/48 and 724/51-

Detailed Geological, Geophysical or Geochemical Surveys, singly, together or combined with physical assessment work, are accepted if the type of work to be charged against a claim or group of claims is clearly indicated, and,

- (a) Only to hold a claim for the year during which the survey or examination is made;
- (b) but shall not be counted as assessment work for more than one year during any period of five consecutive years in the life of a claim.
- (c) If grouped, detailed survey or examination to be made of every claim in the group, unless other assessment work is done or payment made in lieu thereof for the claim not so surveyed or examined. In each case of geological work not more than one in four claims surveyed or examined to be devoid of outcrops.

WHO MAY CONDUCT SURVEYS

For Geological or Geochemical Survey - must be a geologist, or registered professional engineer, and if not listed as a Geological Engineer registered in British Columbia, must file qualifications.

For a Geophysical Survey - must be a graduate of a recognized university, or a competent operator working under a Geological or Mining Engineer registered in British Columbia. If the operator is not a graduate of a recognized university his qualifications must be filed.

STATEMENT OF WORK

Affidavit, in duplicate, must detail -

- i) days worked by all persons employed;
- ii) rates of fee, salary or wage paid;
- iii) total amount paid to each man employed.

BASIS FOR EVALUATION

The evaluation of geological geophysical and geochemical work includes only the costs in respect of fees, salaries, and wages for work performed on the ground, and services as follows -

- (a) Geologist making a geological or geochemical survey, or qualified geophysical operator rated at not more than \$35 for each day worked.
- (b) Consulting engineer at such rate as may actually be paid to him but the total allowed at a rate higher than \$35 for each day worked not to exceed 10 per cent of the value allowed for the assessment work.
- (c) Specially qualified workers not registered engineers, to be rated at not more than \$15 for each day worked.
- (d) Others to be rated at not more than the wage regularly paid to miners in the locality.

- (e) Applicant must state -
 - i) why specially qualified worker was required;
 - ii) why service of others was required;
 - iii) nature of work done by members of the survey party.

MINING RECORDER AND CHIEF GOLD COMMISSIONER

Evidence of expenditure, plans and reports in respect to Geological, Geophysical and Geochemical Surveys must be submitted to the Mining Recorder for the Mining division in which the claim is situated - on Form D.

This material is in turn sent to the Chief Gold Commissioner who with the advice of the mining engineer of the Department determines the value of the work.

Representation work to the value of \$100 must be performed on each claim, each year.

CREDIT FOR ASSESSMENT WORK

To obtain credit for a Geological, Geophysical or Geochemical Survey, as one year's assessment work the nature of the work must be clearly detailed - on Form D. If any combination of the above mentioned surveys and physical work is performed, the affidavit must clearly detail the type of work to be charged against each claim, and,

If the work is performed on a group, the nature and type of the work to be charged against each claim must be clearly indicated.

Maps, Plans and a Report, in duplicate, must accompany each survey.

GEOLOGICAL SURVEY

MAPS AND PLANS

Plans should show all geological observations, including outcrops observed.

REPORTS

The Report should indicate clearly the procedure followed and record the results of the observations made, e.g. the position of outcrops and the nature of material exposed. The interpretation of the observations should be clearly set out.

SURVEYS NOT ACCEPTED

The counting of a geological, geophysical or geochemical survey as assessment work may be refused if the Chief Gold Commissioner considers that the records of such work are inadequate.

STATUTORY EVIDENCE

Satisfactory evidence of the expenditure incurred for a geological, geophysical or geochemical survey must be submitted.

MAPS AND PLANS

Plans should show all geophysical observations.

REPORT

The Report must record clearly the results of geophysical observations made, e. g. the position where each reading was made and the reading recorded.

The interpretation of observations should be clearly set out.

The work must be outlined; the method or methods used and the instruments and equipment used must be stated as well as the procedure followed.

GEOCHEMICAL SURVEYS

MAPS AND PLANS

Plans should show the locations of all geochemical samples, and results thereof.

REPORT

The Report must clearly set forth the procedure followed in taking samples and in analyzing them. The position from which each sample was taken and the analysis of the sample should be recorded.

ONTARIOASSESSMENT WORK ACCEPTED

Under the provisions of Section 81 of "The Mining Act" -

A Geological Survey
or
A Geophysical Survey,
either Ground or Airborne
by recognized methods,

satisfactory to the Minister, may be accepted as assessment work by the Department of Mines.

WHO MAY CONDUCT SURVEYS

For a Geological Survey - work must be conducted by a geologist having qualifications acceptable to the Department, and

For a Geophysical Survey - by an operator who can furnish credentials of qualification and references where deemed necessary.

STATEMENT OF WORK

For the surveys full reports and plans, in duplicate, satisfactory to the Minister, must be submitted and approved by him within 60 days of the recording of the work - otherwise no credit is allowed.
Also see Reports.

BASIS FOR EVALUATION

Assessment work credit allowed is 4 days' work for each day each man is necessarily employed in a Geological or Geophysical (Ground) Survey, and

20 days' work for each mile of continuous recordings in an Airborne Magnetic Survey, and

The maximum allowance for such surveys must not exceed 40 days for each claim, and

The work must be recorded equally on each claim of the survey.

REPORT TO MINING RECORDER AND DEPARTMENT

Survey should first be reported to the local Mining Recorder.

The results submitted to the Department should include a statement indicating the number of days recorded against claim on account of the survey.

LINE CUTTING

- (a) Maximum allowance for line-cutting, picketing and chaining is five man-days a claim;

- (b) If both geological and geophysical surveys are submitted for assessment work the man-days used in line cutting may be credited entirely to the geophysical survey or the amount allowed in (a) preceding, may be credited to the geological survey where line cutting was essential to the survey.

FIELD WORK

Time spent travelling to and from the property is not accepted.

CREDIT FOR ASSESSMENT WORK

GEOLOGICAL SURVEY

To obtain credit as assessment work for a Geological Survey certified copies of maps, plans and report must be submitted in duplicate.

The person in charge of the survey must provide a signed statement setting forth -

- (a) the names and addresses of all persons engaged in the preparation of the plans and report.
- (b) The number of 8-hour man-days work, with covering dates spent by each person in various phases of the survey - line cutting, geological mapping, draughting, preparation of the report, etc.

MAPS AND PLANS

Maps and Plans should be on a scale of not more than 500 feet and not less than 100 feet to one-inch showing N. direction - whether astronomic or magnetic, and showing clearly and exactly all geological observations together with -

- (a) Claim lines, and numbers, transit or plane-table stations, base lines, picket lines and traverse lines.
- (b) Topographical features; railroads, roads, etc.
- (c) Outcrops in colour and by letter or number corresponding to the rock type as listed in the legend or table of formations.
- (d) Overburden (boulder clay gravel, sand, clay), and distribution of swamp, muskeg, and forest cover.
- (e) Other pertinent geological features - contacts, faults, alteration, shearing, etc.
- (f) Locations and horizontal projections of drill holes.
- (g) Formation tables, property owner, covering dates of survey and signature of geologist responsible for the survey.
- (h) Key map showing location of property.

REPORT

The Report of a Geological Survey should be typewritten in duplicate and should show clearly and exactly all geological observations of structural significance.

The Report should also contain -

- (a) Location of and means of access to property.
- (b) Names and addresses of owners of the property, etc.

GEOPHYSICAL SURVEY

(Ground)

To obtain credit as assessment work a certified Report of a Geophysical (Ground Survey) must be submitted, in duplicate, and clearly set forth -

- (a) reasons for the survey;
- (b) results obtained and other relevant data, including -
 - i) name of firm;
 - ii) dates upon which the field work was done;
 - iii) type of instrument used (scale constant or sensitivity).
 - iv) total stations established.
 - v) number of miles of line cut.

SURVEYS NOT ACCEPTED

Recording of assessment work is not confirmed if the survey data are not presented in a satisfactory form, or if no new information of geological or geophysical significance has been obtained.

INFORMATION FULLY DISCLOSED

If any geological data contained in a Report or shown on the Plans have been obtained from any source other than the present report such must be fully disclosed.

INFORMATION FOR PUBLIC

All information relating to a Geological or Geophysical Survey submitted as assessment work is available to the public.

MAPS AND PLANS

A certified map or maps, in duplicate, must be submitted on a scale of 1 inch = 400 feet and indicating -

- (a) lines, station points and values of the readings taken;
- (b) The magnetic profiles and/or contours as determined from the magnetic values, plus the geophysical interpretations;
- (c) Location of main-base control point (to be clearly marked on the ground by a durable peg or other marker);
- (d) Topographical features and survey lines;
- (e) Known geological or drill data to substantiate geophysical interpretations;
- (f) Magnetic surveys should be tied-in to Ontario Department of Mines base stations wherever possible, where these have been established or to control points set up by other geophysical parties where such are known. The method of making the tie-in and its assumed accuracy should be given.
- (g) Key map showing location of the property.

If no separate geological report and map are submitted the Report should give the pertinent geological data.

Minor amounts of geological work as are commonly done with Geophysical Surveys may be included with the geological survey.

Magnetic surveys for assessment work include dip needle and superdip or other low sensitivity surveys only where . . . quite satisfactory for the work outlined and the results provide useful information.

Geophysical surveys must be laid in grid-fashion - to have all station points accurately located.

Choice of spacings between the lines and station intervals along the lines depend on local conditions and on the size of the survey. Generally -

- 300-foot spacings and 100-foot intervals for smaller survey;
- 400-foot spacings and 200-foot intervals for larger surveys.

REPORT

The Report of a Geophysical Survey should include a breakdown of man-days actually required on the survey under the following headings:

- (a) line cutters
- (b) instrument operators and technical assistants:
- (c) draughtsmen;
- (d) consultants - field and office work;
- (e) others - not including cooks or packers, etc.

AIRBORNE MAGNETIC SURVEYS

Airborne Magnetic Surveys - continuous strip recordings - may be recorded as assessment work and the following is required:

- (a) name of firm making survey;
- (b) name of consultant responsible for the interpretive map and report.

MAPS AND PLANS

Certified map or maps, in duplicate, on a scale of 1 inch to 1,320 or less feet to show -

- (a) flight lines and magnetic profiles and/or contours, with values at convenient intervals along the lines;
- (b) value and location of assumed "normal", and the total earth's field where known;
- (c) all topographical features - lot and concession lines, roads, lakes, rivers, etc.
- (d) known geological data;
- (e) key map to the location of the survey area.

REPORT

Certified reports, in duplicate, must give all relevant data as regards -

- (a) type of instrument
- (b) accuracy of survey
- (c) method of control
- (d) dates on which field work was done.
- (e) total miles flown, whether mapped area isolated or a part of a larger survey, (give total area.)

Airborne Surveys must be laid out in an orderly manner and line spacing must not exceed 1/4 mile for any survey area. And closer spacings for smaller areas are necessary.

GEOPHYSICAL PROSPECTING LICENSE.

Under the provisions of Section 205(1) of "The Mining Act" where the Minister is satisfied that any terrain, due to the paucity of rock outcrops, cannot be prospected or explored by other than geophysical or other technical methods, he may, subject to the approval of the Lieutenant-Governor in Council, issue a license to prospect for base metals and minerals other than petroleum, oil and natural gas.

And it is provided that - Term of license 3 years, annual license fee \$1,000. Area not greater than 64,000 acres. Deposit of \$15,000 refundable if Minister is satisfied that work was done.

Annual expenditure \$1.00 an acre but not less than \$25,000 annually - in geological, geophysical or other similar exploratory work, or drilling.

If a deposit of mineral is found and deemed by the Minister to be of economic importance, the licensee is entitled to a lease of not more than 10 per cent of the area for which the license was issued.

Term of lease is 10 years. Annual rental is 50 cents to \$3.00 an acre.

Lease may be renewed for further terms of 10 years at rental set by the Minister.

QUEBEC

ASSESSMENT WORK ACCEPTED

Under the provisions of Section 80 of "The Quebec Mining Act" - for lands held under claim or development license - the Minister may accept geological work or geophysical prospecting to such an extent and upon such conditions as he may deem expedient.

The Department of Mines - by ruling - accepts the following for assessment work -

A Detailed Geological Survey including a Geochemical Survey
A Geophysical Survey, including Ground and Airborne Survey
by recognized methods.

WHO MAY CONDUCT SURVEYS

For a Detailed Geological Survey - work must be conducted according to the professional standing of geologists and

For a Geophysical Survey - work must be conducted by a competent operator under professional supervision.

STATEMENT OF WORK

Application for accepting a survey as assessment work must be accompanied by a sworn statement of the number of days employed in line cutting and work relating to the survey signed by the person under those professional supervision the survey has been conducted. Also see Reports

BASIS FOR EVALUATION

In evaluating the work of these surveys there is allowed for

Line cutting - the total number of days of eight hours employed on the work;

Work relating to the survey - the total number of days of eight hours multiplied by the factor seven.

CORE LOGGING

Logging of diamond-drill core is not accepted for special credit since the compilation of these logs has already been taken into consideration when credit for diamond drilling was established.

LINE CUTTING

Lines already cut and work credited to one survey preceding another are not accepted for assessment work but any new lines cut for a new survey are considered for credit.

FIELD AND OFFICE WORK

Work relating to the surveys should include both field and office work but time spent in travelling to and from the field and time lost through weather etc. is not accepted.

CREDIT FOR ASSESSMENT WORK

DETAILED GEOLOGICAL SURVEY

To obtain credit as assessment work for a Detailed Geological Survey certified copies of plans, preferably coloured and reports must be submitted.

The person having professional supervision of the survey must submit a sworn statement of the number of days employed in

- (a) line cutting and
- (b) work relating to the Geological Survey.

MAPS AND PLANS

While it is not intended to adopt any rigid rule, as circumstances from property to property vary, the type of geological survey of claim groups in Western Quebec suggested is one that can be conveniently plotted on a scale of 200 to 300 feet per inch.

Maps and plans certified should show exactly all geological observations together with -

- (a) claim boundaries, traverse or picket lines;
- (b) important lakes, rivers and topographical expressions where possible, roads and power lines.
- (c) rock outcrops and pertinent geological observations - preferably using colours to differentiate various rock-types. The report should set forth clearly the interpretation of the observations.
- (d) Superficial geology - swamps, gravel and sand ridges, clays;
- (e) interpretative geology - assumed contacts, faults, areas of alteration and other pertinent features;
- (f) drill data used in compiling the survey;
- (g) key map showing location of claims with respect to township boundaries.

REPORT

The Report of a Detailed Geological Survey should clearly set forth the interpretation of the geological observations.

The Report of the Detailed Geological Survey should state clearly the -

- (a) methods of work
- (b) results obtained, and
- (c) recommendations made.

If lines have already been cut and the work credited (for a Geophysical survey preceding the Geological survey) an application for additional credit is not considered.

GEOPHYSICAL SURVEY

To obtain credit for a Geophysical Survey certified copies of Plans and a Report must be submitted.

The person having professional supervision of the survey must submit a sworn statement of the number of days employed in

- (a) line cutting,
- (b) work relating to the Geophysical Survey.

SURVEYS NOT ACCEPTED

The Department reserves the right to refuse work of geological or geophysical prospecting if records are considered inadequate, or if no noteworthy new information has been obtained in a geological survey.

STATUTORY EVIDENCE

Satisfactory evidence of the expenditures incurred for Detailed Geological Surveying or Geophysical Surveying must be submitted.

MAPS AND PLANS

Maps and Plans certified should show all geophysical observations and indicate -

- (a) Basic numerical information essential to the interpretation of the results of the survey;
- (b) If the survey has been made by magnetic methods from the ground or by spontaneous polarization, the corrected numerical values of the readings in physical units must be given.
- (c) Main base control point accurately located and durably marked on the ground.
- (d) Location markers, as townships, range, lot or chain lines; lakes or rivers; roads, railways and power lines;
- (e) Outcrops or drill holes and any interpretive geology should be coloured or designated as the legend.
- (f) Magnetic Surveys should be tied to base-stations established by the Dominion Observatory, if there is one in the vicinity; elsewhere they should be tied to main control stations established by one of the geophysical companies.
- (g) A small key-map locating claims with respect to the township boundaries inserted on the main map.
- (h) Detailed Geological Surveys should be submitted separately from Geophysical Surveys, for acceptance under the ruling concerning Detailed Geological Surveys.

REPORT

The Report of a Geophysical Survey should include a statement of a breakdown of man-days necessary for the survey, showing -

- (a) line cutters;
- (b) instrument men and technical assistants.
- (c) draughtsmen;
- (d) other office or laboratory work;
- (e) others.

The report submitted should indicate -

- (a) miles of lines cut;
- (b) number of stations established;
- (c) total acreage covered.

CREDIT FOR ASSESSMENT WORK

AIRBORNE MAGNETIC SURVEYS

No distinction is made between Ground and Airborne Geophysical Surveys.

In the case of Airborne Surveys, the applicant must submit, as in other surveys a statement of the man-days necessarily put into the work together with the usual report and maps.

ALBERTA

ASSESSMENT WORK ACCEPTED

Under Section 97 - Part II - of "The Mines and Minerals Act" provision is made for the Representation (Assessment) Work required to be performed each year on a mineral claim. In Part VII of the Act which applies to all lands in the Province, provision is made for the conduct of preliminary and Detailed Geophysical and Subsurface Geological Exploration.

WHO MAY CONDUCT EXPLORATION

Any person desiring to undertake Geophysical or Subsurface Geological Exploration must obtain a license to do so from the Director of Mineral Rights. A cash deposit of \$1,000 must be made to the Provincial Treasurer as security for the conduct of operations. In case of default the license is cancelled and the deposit is forfeited. License expires March 31 following the date of issue.

Any person operating geophysical equipment must be the holder of an operating license or employed to perform duty for the holder of an operating license.

STATEMENT OF WORK

Upon completion of the Exploration work and within six months thereafter the licensee must furnish the Department with a statutory declaration with respect to expenditures incurred, together with maps and reports, etc.

BASIS FOR EVALUATION

Representation work to the value of \$150 satisfactory to the Mining Recorder must be performed each year after the recording of a claim.

Geophysical or Subsurface Geological Exploration may be accepted under the provisions of Section 97 of the Act.

CREDIT FOR ASSESSMENT WORK

To obtain credit for Geophysical or Subsurface Geological Exploration representation (assessment) work, the person undertaking the work must apply to the Director of Mineral Rights for a license and indicate to him -

- (a) the type
- (b) the extent, and
- (c) general location of the exploration and in some cases
- (d) the time estimated to complete the work.

Two types of exploration work must be undertaken - Preliminary or Detailed Geophysical or Subsurface Geological Exploration.

The Preliminary is a survey of specifically limited areas to obtain local data.

The Detailed is a survey of widespread areas to obtain regional data.

MAPS

Upon completion of exploration of either type the licensee must furnish the Department with -

- (a) Maps for Preliminary Exploration showing areas covered by the survey or surveys and for Detailed Exploration showing the location of shot and core holes drilled and their elevations.

REPORT

Monthly reports of the location and progress of the field party conducting the exploration must be submitted by the licensee.

A Summary Report for Preliminary Exploration stating the generalized regional data obtained and for Detailed Exploration a Summarized Preliminary Report setting out the regional geological features of the area, interpreted on the basis of the factors and necessary assumptions involved.

All information regarding the presence of water, coal, gravel, sand and other potentially useful minerals revealed by shot and core holes.

INFORMATION FOR PUBLIC

If the licensee discontinues work in the Province all Geophysical or Subsurface Geological data obtained become the property of the Province and may be used after one year in any manner which may expedite development of the natural resources.

MANITOBAASSESSMENT WORK ACCEPTED

Under the provisions of Section 52 of the Regulations under "The Mines Act" the following may be accepted for assessment work for a period of one year; .

- A Geological Survey
- A Geophysical Survey

by recognized methods.

WHO MAY CONDUCT SURVEYS

The person conducting or supervising the survey must be registered under "The Engineering Profession Act".

For a Geological Survey - must be an experienced and fully qualified geologist.

For a Geophysical Survey - must be an experienced and fully qualified operator.

STATEMENT OF WORK

Maps, Plans and Reports of Geological or Geophysical Surveys must be furnished to the Mining Recorder within one month after the anniversary recording date in the year in which the survey was made.

Also see Reports.

BASIS FOR EVALUATION

A Geological or Geophysical Survey of a claim may be credited as one year's assessment work.

CREDIT FOR ASSESSMENT WORKGEOLOGICAL SURVEY

A Geological Survey of a claim, where the bedrock is totally obscured by drift, muskey or water is not accepted for assessment work unless the claim is one of a group of six or more claims for which geological surveys are simultaneously submitted.

PLANS

To record a Geological Survey for assessment work there must be furnished certified copies of plans showing exact position of all outcrops and diamond-drill holes, and all geological observations.

REPORT

A Report clearly setting forth the interpretation of the geological observations of the entire group of claims in the survey must be furnished.

GEOPHYSICAL SURVEY

PLANS

To record a Geophysical Survey for assessment work there must be furnished certified copies of plans showing all geophysical observations.

REPORT

A report, certified, clearly setting forth the interpretations of all geophysical observations must be made.

SURVEYS NOT ACCEPTED

Geological or Geophysical Surveys may be refused as assessment work, if, in the opinion of the Director, they are inadequate or of poor quality.

STATUTORY EVIDENCE

A statutory declaration covering the expenditures incurred for the geological or geophysical survey must be filed.

INFORMATION FOR PUBLIC

If a claim or lease is abandoned, etc. all geological or geophysical information submitted becomes the property of the Province.

MANITOBA (Special)

AIRBORNE GEOPHYSICAL INVESTIGATIONS- (Sections 91-94 of the Regulations)

A permit is required to operate Airborne Geophysical equipment over any part of the Province.

Application for permit, calls for -

- (a) Fee of \$50.
- (b) Deposit of \$20,000 as guarantee to submit data within three years.
- (c) Description and plan of area proposed to survey from the air.

Permit terminates 12 months after date of issue.

The permittee authorized to use Airborne Geophysical Equipment must within 3 years of the date of expiration of permit, submit -

- (a) complete maps and report;
- (b) Geological, geophysical and other data obtained as a result of investigation covering all areas investigated, except those acquired for further development by the permittee.

Deposit is refunded at any time after maps and report are approved.

Deposit is forfeited if maps and report not submitted on time.

GEOPHYSICAL RESERVATIONS

Regulations under "The Mines Act" - Sections 78-90 - provide that certain tracts of land in the province may be reserved for Geophysical examinations, with approval of the Director.

Application must be made to the Chief Mining Recorder between October 31 and April 30 following. The fee is \$500, and cash deposit of one dollar per acre is held to guarantee an expenditure equal to the deposit.

Area of reservation must not exceed 200,000 acres, nor be less than 10,000 acres. Term of reservation is for 12 months which may be extended in three month periods for another year. Fee for renewal is \$125 for each three month period.

On termination of the reservation the holder has the exclusive right to apply for certain areas.

NEW BRUNSWICKASSESSMENT WORK ACCEPTED

Under the provisions of Section 128 of "The Mining Act" Regulations governing certain work on mining claims and mining licenses, Geological Geophysical and Geo-chemical Surveys may be accepted with the approval of the Minister of Lands and Mines.

WHO MAY CONDUCT SURVEYS

All work must be performed and report prepared by personnel having requisite qualifications satisfactory to the Minister.

STATEMENT OF WORK

The nature of the work and the expenditure incurred must be clearly detailed and verified by affidavit.

BASIS FOR EVALUATION

Costs are accepted only in respect of fees, salaries and wages for work performed on the ground - at rates satisfactory to the Minister. An affidavit must be submitted detailing expenditures for the work.

The actual cost of work may be recorded as work at the rate of one day's work for each five dollars spent.

The Act requires that work performed on a 40-acre claim before November first of each year must be to the extent of 25 days of eight hours each.

CREDIT FOR ASSESSMENT WORK

To obtain credit for assessment work plans and maps, and a full report satisfactory to the Minister must be submitted.

MAPS

Maps must be bound in the Report or inserted in an envelope fastened securely in the folder.

NOVA SCOTIAASSESSMENT WORK ACCEPTED

Under the provisions of Section 36 (2) of "The Mines Act" expenditures on Geological and Geophysical Surveys may be accepted by the Minister as satisfying the requirements of work to be done.

WHO MAY CONDUCT SURVEYS

Reports on a property prepared by a professional engineer registered as a geologist or a mining engineer in the Province may be accepted, providing the reports interpret new information made available by the work of the licensee.

STATEMENT OF WORK

Not later than fifteen days from the time allowed for the performance of each instalment of work a licensee must report to the Minister the amount and nature of the work done under the license - on Form D, under affidavit.

BASIS FOR EVALUATION

A licensee must perform in each license year on the claim eighty man-days work. In lieu thereof geological or geophysical work may be done and the expenditure incurred may be considered to such extent and on such scale and at such money equivalent as the Minister may determine.

CREDIT FOR ASSESSMENT WORK

In reporting in writing to the Minister a licensee must include certified copies of all or any geological or mining reports made for him. These must be accompanied by plans and report.

PLANS

Certified copies of plans at a scale no smaller than 200 feet to one inch, showing the position and extent of all surface work done on the property are required.

NEWFOUNDLANDASSESSMENT WORK ACCEPTED

Under the provisions of Section 39 (Also Section 64) of "The Crown Lands (Mines and Quarries) Act" -

A Geological Survey

or

A Geophysical Survey

of a mining claim undertaken with the written approval of the Minister and completed to his satisfaction may be counted as assessment work.

STATEMENT OF WORK

For the survey full reports and plans in duplicate must be submitted to the Department and approved by the Minister before the expiration of 60 days after the recording of such work - otherwise no credit is allowed.

BASIS FOR EVALUATION

Assessment work credit allowed is 4 days of 8 man-hours each for every day of 8 man-hours of work actually done by every man who in the opinion of the Minister, is necessarily employed in the work of

A Geological Survey

or

A Geophysical (Ground) Survey, and - for Airborne Geophysical
or Magnetic Surveys -

20 days of 8 man-hours each for each continuous mile of recordings.

No more work may be counted for each mining claim than 40 days of 8 man-hours each in these surveys.

Any such survey is deemed to have been performed on every mining claim actually covered by the survey.

CREDIT FOR ASSESSMENT WORK

See Statement of Work

YUKON AND NORTHWEST TERRITORIESASSESSMENT WORK ACCEPTED

Under the provisions of Section 54 of "The Yukon Quartz Mining Act", or Section 51 of "The Quartz Mining Regulations" respectively, work performed in

Geological Investigations, Aerial Reconnaissance or other like preliminary operations, may be accepted for representation (assessment) work.

STATEMENT OF WORK

Within fourteen days in the Yukon Ty. and one month in the N. W. Ty. after the expiration of each period during which representation work should be done, the claim holder must furnish the Mining Recorder with evidence, under affidavit, containing a detailed statement, in duplicate, of work done, where done, and a sketch clearly indicating the position and extent of the work.

BASIS FOR EVALUATION

Representation work to the value of \$100 must be performed each year on each claim.

Consideration may be given to the expenditure incurred in the performance of Geological Investigations, etc. or such portions of them as the Commissioner in the Yukon Ty. or the Director in the Northwest Ty. may consider justifiable. The work must be done in the first three years subsequent to the date of record of the claim or group of claims.

CREDIT FOR ASSESSMENT WORK

To obtain credit for geological investigation, etc. as representation work, evidence of the work performed must be submitted to the mining recorder.

MAPS

Copies of all maps and other information, in duplicate, must accompany the Statement of Work.

SURVEYS NOT ACCEPTED

If in the opinion of the Commissioner or the Director, the prescribed work has not been done or sufficient work has not been performed, a certificate of work is not issued.

SASKATCHEWANASSESSMENT WORK ACCEPTED

Under the provisions of Section 51 of the Regulations Governing the Disposal of Quartz Mineral Claims under "The Mineral Resources Act", the following may be accepted for assessment work for the year in which the work was done:

- A Detailed Geological Survey
- A Geophysical Survey

by recognized and approved methods.

WHO MAY CONDUCT SURVEYS

For a Detailed Geological Survey, work must be conducted by a geologist having qualifications acceptable to the Department, and

For a Geophysical Survey - by a competent person having qualifications acceptable to the Department.

STATEMENT OF WORK

Maps, Plans and Reports of Detailed Geological or Geophysical Survey must be filed within twelve months from the completion of the survey.

Also see Reports.

BASIS FOR EVALUATION

Representation (assessment) work to the value of \$100 must be performed on each claim for each of ten successive years.

A Detailed Geological Survey of a claim may be credited as one year's assessment work.

A Geophysical Survey (Ground) of a claim may be credited as one year's assessment work for the year in which the work was done.

CREDIT FOR ASSESSMENT WORK

To obtain credit for a Detailed Geological Survey or a Geophysical (Ground) Survey as one year's assessment work, maps, plans and reports accurately designating the location and characteristics of the phenomena investigated and the actual, probable and possible interpretation must be filed.

DETAILED GEOLOGICAL SURVEYMAPS AND PLANS

For Detailed Geological Survey - Plans must be drawn in ink on paper or linen suitable for reproduction and be on appropriate scale but not more than 500 feet to an inch and signed by the geologist responsible for the work, and should show:

- (a) Scale and N. direction - astronomic or magnetic
- (b) Lakes, rivers, streams and other noteworthy topographical features.
- (c) Base and Traverse lines.
- (d) Outcrops in colour for rock-types as listed in legend
- (e) Overburden - clay, gravel, sand and swamp, muskeg and forest cover.
- (f) Schistosity, faults, attitude of flows and stratified rocks.
- (g) Location of trenches, etc. and location and projection of drill holes.
- (h) Zones of shearing, alteration or mineralization.
- (i) Formation tables, symbols, name of owner of claims surveyed.

REPORT

The Geological Report must be typewritten and signed by the geologist in charge of the work and should contain -

- (a) Location and means of access to the property;
- (b) Names and addresses of owners of the property, claims held, names and addresses of parties submitting the survey as assessment work and the covering dates during which the survey was made.
- (c) Formation tables
- (d) All relevant data as to types, structures, mineralized zones of interest and assay values obtained.
- (e) Summary of exploration and development done on the property.
- (f) Character and dimensions of veins and mineralized zones.

SURVEYS NOT ACCEPTED

A Geological or Geophysical Survey may not be credited against a claim if the Department considers that the records of such work are inadequate.

INFORMATION FULLY DISCLOSED

If any geological data submitted in a report or shown on the plans has been obtained from any source other than the present survey such must be fully disclosed.

GEOPHYSICAL SURVEY

MAPS AND PLANS

Scale of the map accompanying a Geophysical (Ground) Survey must not be greater than 200 feet to an inch.

Survey should be laid out in grid fashion and, generally, lines not to have more than 300 feet spacing; on a survey of 21 claims or more 400 feet is accepted.

Lines should be cut unless conditions make it unnecessary or infeasible.

REPORT

The Report should contain:

- (a) Reasons for survey.
- (b) Type of instrument used. (scale constant or sensitivity)
- (c) Results obtained.
- (d) Name of engineer in charge of survey.
- (e) Name and description of claims surveyed.
- (f) The Report should be signed.

Where no Geological Report and Maps are submitted, the Geophysical Report should give the pertinent geological data.

EDITOR'S REMARKS

The layout of the foregoing material on assessment work as originally submitted by Colonel Cole admirably facilitated comparison of the Regulations of the various provinces, the Yukon and the Northwest Territories. Unfortunately the layout used by Colonel Cole could not easily be adapted to the form of report adopted and it was necessary to reproduce it as presented herewith.

APPENDIX - "F"
REPORT OF THE PROVINCE OF ALBERTA
ON
ROYALTIES AND TAXATION OF INCOME DERIVED
FROM MINERAL PRODUCTION

By the terms of the tax rental agreement dated September 22, 1952 between the Government of Canada and the Government of the Province of Alberta, the Province agreed to suspend the levying and collection of income taxes, corporations income taxes and corporation taxes until after December 31, 1956.

Corporation income tax is interpreted as a tax that is levied on the net income or any part thereof of a corporation. Corporation tax means a tax or fee other than a tax on net income but including a tax on gross revenue or any part thereof.

The Province is entitled to levy and collect:

1. rentals and royalties on leases, permits, licenses and other agreements pertaining to mineral resources vested in the Crown in the right of the Province,
2. royalties reserved to the Crown in any patent of a mineral, and
3. a tax on freehold minerals.

Full power rests with the Province to determine the rental to be charged for a lease, license, permit, etc., of a mineral but the royalty must be determined by reference to the quantity or value or both of the mineral recovered. The royalty may be varied from time to time by order of the Lieutenant Governor in Council excepting for coal recovered from any lease, its renewal or any patent where the rate of royalty on coal was specifically set by the Federal Government prior to the transfer of the resources to the Province on October 1, 1930.

The Mineral Taxation Act applying to freehold minerals is not affected by the Tax Rental Agreement. Rates of tax collectible under this Act may be varied from time to time by order of the Lieutenant Governor in Council.

A Municipality is permitted to levy and collect: A tax on mining property located at or on the surface of the ground.

APPENDIX - "G"

INTERPROVINCIAL PETROLEUM and NATURAL GAS COMMITTEE
(Minister of Mines)

Department of Mineral Resources,
Government Administration Bldg.,
Regina, Saskatchewan.

September 15, 1954.

The Chairman,
Interprovincial Petroleum and Natural Gas Committee,
Mines Minister's Conference,
WINNIPEG, Manitoba.

Dear Sir:

In accordance with the directives given to the Conservation Sub-Committee at the meeting of the Interprovincial Petroleum and Natural Gas Committee in Calgary on June 24th, 1954, herewith is presented, in summary form, the results of the Conservation Sub-Committee's survey of reservoir data availability.

The report on reservoir data availability consists of a simplified tabulation as to source and publication of the data related to reservoir and well behaviour. This is followed by a more detailed discussion of the policy adhered to by each source in the gathering, recording and publication of this data. While it is impossible in a report of this nature to set out in detail the minor variations in recording and publishing data from diversified sources, it is felt that this report provides a fairly comprehensive survey of the important contributors to reservoir data compilations.

The Committee members, Mr. E. H. Vallat of Triad Oil Company, 505 - 8th Avenue West, Calgary and Mr. D. R. Craig of the Petroleum and Natural Gas Conservation Board, 514 - 11th Avenue West, Calgary, as well as the undersigned will be pleased to elaborate on any of the details of the report.

Yours very truly,

A. J. Williams, Chairman
Conservation Sub-Committee.

RESERVOIR DATA AVAILABILITY

	GOVERNMENTAL SOURCES					INDUSTRIAL SOURCES			
	B. C. Dept. of Mines	Alta. P. & N. G. Cons. Bd.	Sask. Dept. Min. Resources	Manitoba Dept. Mines & Nat. Resources	Ont. Fuel Board	Federal Dept. Mines & Tech. Surveys	Industry Assoc- iations	Publicat- ion and Services	Operators Code Remarks
<u>A. DRILLING INFORMATION</u>									
1. Location	P	P	P	P	P	O	O	P	R Readily available
2. Penetration rates	R	R	O	Pt. R	O	O	O	O	R Restricted
3. Drill stem tests	R	P	P	P	O	O	O	P	R Delayed dissemination
4. Cored intervals	R	R	R	P	R	O	O	P	R Restricted
<u>B. COMPLETION INFORMATION</u>									
1. Casing and tubing									
2. Perforations	R	P	P	P	R	O	O	P	R Readily available
3. Treatments	R	P	P	R	R	O	O	P	R Readily available
4. Cement, plugs, etc.	R	P	P or R	R	R	O	O	P	R Restricted
5. Production tests	R	R	Pt. P, Pt. R	R	P	O	P	P	R Readily available
<u>C. GEOLOGICAL INFORMATION</u>									
1. Drill cutting samples									
2. Cores	R	R	R	R	R	R)	O	P	R Restricted
3. Logs	R	R	R	R	O	O)G	O	O	R Restricted
4. Geological markers	R	R	R	P	P	O)S	O	P	R Delayed dissemination
5. Geophysical data	R	R	P	R	O	Pt. O. Pt. R)C	P	P	R Delayed dissemination
						Pt. O. Pt. R)	O	O	R Confidential
<u>D. RESERVOIR ROCK PROPERTIES</u>									
1. Porosity									
2. Permeability	R	R	R	R	O	O	O	P	R Restricted
3. Lithofacies control	R	R	Pt. R, Pt. O	O	O	O	O	P	R Restricted
4. Reservoir fluid saturation	O	R	R	R	O	O	O	P	R Restricted
<u>E. RESERVOIR FLUID PROPERTIES</u>									
1. P. V. T. relationships	R	R	R	R	O	O	O	P	R Restricted
2. Water, gas & oil analysis	R	P	R	R	R	Pt. P	O	P	R Restricted

RESERVOIR DATA AVAILABILITY (CONT'D)

	GOVERNMENTAL SOURCES						INDUSTRIAL SOURCES			
	B. C. Dept. of Mines	Alta. P. & N. G. Cons. Bd.	Sask. Dept. Min. Resources	Manitoba Dept. Mines & Nat. Resources	Ont. Fuel Board	Federal Dept. Mines & Tech. Surveys	Industry Assoc- iations	Publicat- ion and Services	Code	Remarks
F. PERFORMANCE DATA	R	P	R	O	O	O	P	P	R	Readily available
	R	P	P	O	P	O	P	P	R	Readily available
	R	P	R	P	O	O	P	P	R	Readily available
	R	P	P	P	P	O	P	P	R	Readily available
	R	P	R	R	O	O	P	P	R	Readily available
	R	P	P	R	O	O	P	P	R	Readily available
	R	P	R	R	R	O	O	P	R	Readily available
	R	P	R	R	R	O	O	P	R	Readily available
	R	R	R	R	Pt. R	O	P	P	R	Restricted
	O	R	Pt. R, Pt. O	O	O	R	O	P	R	Restricted
G. POOL INFORMATION	O	R	R	R	O	R	O	P	R	Restricted
	O	R	R	R	O	R	O	P	R	Restricted
	O	R	R	O	O	R	O	O	R	Confidential
	O	R	P	O	R	R	R	P	R	Totals readily available

CODE: P - Published
R - Recorded and of limited availability to public
O - Not recorded or available from that source
Pt - Part

(See further explanatory notes)

SUMMARY NOTES ON SOURCES AND AVAILABILITY OF RESERVOIR DATA

BRITISH COLUMBIA

All reports made to the British Columbia Department of Mines are available to the public as follows:

- (1) Geological and geophysical reports are treated as confidential until the individual or company responsible for acquiring the information releases the land involved.
- (2) All information obtained as the result of drilling is treated as confidential for two years following the completion or abandonment date of the well unless the department has written consent of the operator to release same. However, if a well is drilled on a permit and the permit is surrendered without the operator selecting one or more leases, the information may be released immediately.

In the case of development wells in an area designated as a pool or field by the Minister, well information is confidential for only thirty days provided that one year has elapsed from the completion date of the discovery well.

- A. Drilling Information
- B. Well Completion Data

Information under these groups is obtained from Drilling Reports logged daily at the well site since 1947. Prior to this date a Well History Report is obtainable on nearly all wells. Information is available as above but not published.

- C. Geological Information

Cores and samples are logged and stored. This and other submitted information of this category is referred to the Mineralogical Branch for study and compilation.

- D. Reservoir Rock Properties
- E. Reservoir Fluid Properties
- F. Performance Data

Information that has been submitted pertaining to these groups is filed. A programme has been initiated to develop this information.

- G. Pool Information

No information.

ALBERTA

In Alberta the information regarding the normal testing and completion of wells in a designated field is made available through the Petroleum and Natural Gas Conservation Board services and publications. In the case of wildcat wells and deep pool tests this same information is held confidential for one year and is then released through the same channels. Information obtained by an operator at extra expense and beyond that obtained in the normal drilling and completion of a well, is held confidential for one year and is then available at the Board's offices.

Geophysical reports are submitted to the Alberta Department of Mines at the Petroleum and Natural Gas Conservation Board's Calgary office where they are appraised and filed. They are confidential for five years after which they are released at the discretion of the Minister.

A. Drilling Information
B. Well Completion Data

Information is obtained for these groups from Drilling Reports logged daily at the well site. The information for field wells is published immediately and is also compiled on well cards which are available for a small charge. The wildcat and deep pool tests limitations apply in both cases.

C. Geological Information

Information under this heading is directed to the Board's office. It is available as above. Geological Markers are published weekly.

D. Reservoir Rock Properties

This information is available one year from the completion of the well at the Board's office.

E. Reservoir Fluid Properties

Available one year from test at the Board's office.

F. Performance Data

Production is published on a pool basis - monthly.
Published for sale on an individual well basis - monthly.
No daily figures tabulated.

Pressure data is circulated to industry. Productivity data is available after one year. Sources are Board's Field Staff and Industry.

G. Pool Information

Data under this heading are confidential at all times.

SASKATCHEWAN

The release of reservoir data by the Saskatchewan Department of Mineral Resources is controlled largely by the regulations governing confidential status of wells. Wildcat wells have confidential status for one year following the date of their completion. Wells within defined field boundaries have confidential status for thirty days after completion, or for one year from date of completion of the discovery well in the field, whichever may be the later date.

Prior to release of a well from confidential status, the only information on a well which may be released to the public or published by the Department is the following:

Name
Location
Date spudded
Date casing set
Date completed as a new oil or gas well
Pool or formation in which completed
Production statistics.

A. Drilling Information

The location and ground elevation of all wells licensed in the Province is noted in a Well Register, and published in a Weekly Statistical Report.

No data is kept on rate of penetration of formations, bit consumption, etc., as daily drilling reports from the rigs are no longer required under Saskatchewan regulations.

Operators are required to report cored intervals and full data on drill stem tests on a well completion data report, submitted within 25 days of completion of the well. Cored intervals are not published by the Department, but drill stem tests are published in the weekly statistical report during the month following release of the well from confidential status, and also in the annual schedule of wells.

B. Well Completion Data

Operators are required to report details of casing and tubing on the well completion data sheet. Casing details are published, when the well comes off confidential status, in the weekly statistical report and the annual schedule of wells. Tubing data is merely recorded.

Perforations and treatment of any well is reported on the well completion data report within 25 days after such work is carried out. Perforations are published in the weekly statistical report when the well comes off confidential status and in the schedule of wells. Well treatment data is recorded, but not always published.

Data on cement used and where set in casing and plugging programs is reported by the operator and recorded in Department files. Details on casing cementing are published in the weekly statistical report, but abandonment or other plugs are not published.

All wells are allowed an initial unregulated 5 day production test period before the well M. P. R. comes into effect, and details of production during such test are reported to the Department within 12 days of commencement of test. A rough average daily production rate is calculated from this data and reported, when non-confidential, in the weekly statistical report and annual schedule of wells, together with the approximate A. P. I. gravity of the oil produced.

C. Geological Information

Drill cutting samples, taken at 10' or 30' intervals from grassroots to the 2nd White Specks, and at 10' intervals from the 2nd Specks to total

depth, are required to be delivered to the Department Laboratory on all wildcat wells. Special field orders limit the sampling requirements to one or two wells per section within defined fields, and then only from below the 2nd Specks. All samples are washed, bottled and available for study by the public at the Department Laboratory as soon as the well is released from confidential status. A list of such samples available for inspection is published quarterly.

Geological markers are reported by company geologists on the well completion data report. Department geologists make independent picks of the markers in each well from E-log, sample and core examination. Both picks are reported on the weekly statistical report when the well comes off confidential status, and the Department picks are published in the annual schedule of wells.

All cores taken in any drilling in the province are delivered to the Department laboratory and are open to the public for inspection when the well is off confidential status.

Geophysical contour maps submitted for performance credit on Crown permits are filed in the Department and are open for public inspection or for purchase of copies of same some months or years after termination of permit or special agreement.

D. Reservoir Rock Properties

Copies of core analyses, giving porosity, permeability, and reservoir fluid saturation of reservoir rock are filed in the Department by the operators in support of application for M.P.R.'s. These are not published and are kept in confidential files by the Department for at least a year, or longer if circumstances warrant.

Some litho-facies maps are prepared by the Department Geologists but none are submitted by operating companies. The Departmental maps and information in this respect have very limited circulation, and have not been published to date.

E. Reservoir Fluid Properties

Pressure-volume temperature relationships, as reported by the companies on the basis of analyses of bottom hole samples, are recorded in the Department and kept confidential for a period of one year. This information is never published.

Analyses of water taken from drill stem tests and from production fluids are reported to the Department in most cases by the operators. The Department also keeps a chemical laboratory in which water analyses are carried out on any water samples not analysed by the Operators. These analyses have not been published to date, but are available on non-confidential wells in the Department files.

Gas and crude oil analyses are mostly reported by the Operators to the Department and held confidential for a period of one year. When any such analyses are run by the Department they are immediately made available to the public or non-confidential wells but have not been published to date.

F. Performance Data

Gas, oil and water production are reported on a battery and well basis by the operators to the Department each month. Production figures on a pool basis are published in the Department's monthly statistical report approximately 2 months after such production has taken place. Data on individual well production is recorded in the Department and to date has been made available to any interested parties who wish to examine these records in the Department's files.

Static pressure data is recorded by the operators partially on the well completion data report and partially in subsequent field summary reports. This is not published but is available in the Department files when the wells have been released from confidential status, or after one year, in the case of some fields.

Productivity data, including back pressure tests on gas wells, productivity index tests on oil wells and various bottom hole pressure tests, are usually observed and reported by the Department Engineers and are also officially reported by the operators to the Department. This information is recorded on Department files but is not published, except possibly as a portion of the transcript of any Conservation Board hearings.

G. Pool Information

Gas-oil and oil-water interfaces are established whenever possible by Department Geologists and Engineers on the basis of well completion and performance data received. This information is not released to the general public, but may be used by the Department in discussion with pertinent field operators.

Information on drive mechanisms has been rather scanty in Saskatchewan to date due to the limited production from most fields. Little, if anything, has been published on the subject by the Department, but where the drive mechanism has been established there is no attempt to keep such information confidential.

Performance predictions for various pools are seldom received by the Department from the operators and Departmental predictions are not published or made available to the public except as they may be required for Conservation Board hearings.

Gas and oil reserve estimates on the various pools within the Province are made by Departmental staff at the close of each fiscal year ending in March. Such reserve estimates are published in the Department's Annual Reports some nine months later but are not included in any weekly or monthly statistical report or other Department publications.

Gas and oil reserve estimates on a Provincial basis are handled in the same manner as the pool estimates discussed above.

H. Miscellaneous

In addition to the reservoir data discussed in the foregoing and outlined on the availability chart, the Department of Mineral Resources supplies the following supplementary information to the interested public:

- (1) The annual report includes a list of oil and gas discoveries for the year, showing the date, age of producing formation, depth, average pay zone thickness, average well capacity and gravity of crude.
- (2) M. P. R. 's for all wells in the Province are set on an individual well basis rather than on a pool basis, and a list of such M. P. R. 's is published annually. In addition to the annual list, the monthly statistical report includes month to month revisions and additions to the over-all list of M. P. R. 's.
- (3) Maps of all established fields in the Province showing relatively current status of wells (gas, oil, suspended, abandoned) may be purchased from the Department.
- (4) The Statistical Division of the Department will shortly be releasing the first of their annual statistical reports, which include:

Summary of crude oil, natural gas and water production by year, month, field, pool, crown and private.

Summary of producing wells - by year, field, crown and private.

Summary of crude oil disposition - by month and year.

Summary of drilling statistics - by year.

MANITOBA

The procedure used by the Manitoba Department of Mines and Natural Resources for the release of reservoir data follows closely that of the provinces of Saskatchewan and Alberta. Wildcat wells have confidential status for one year following the date of their completion. Wells within defined field boundaries are given non-confidential status on completion.

Prior to release of a well from confidential status, the only information which is released to the public or published by the Department is the following:

Name
Location
Elevation
Date Spudded
Size and length of surface casing
Date drilling completed
Total depth
Date on pump or on flow
Date abandoned
Production statistics.

A. Drilling Information

1. The location and ground elevation of all wells licensed in the Province is recorded, and published in a monthly Schedule of Wells.
2. Rate of penetration is recorded when received but the information is not requested. Daily tour reports from the rigs are required by the Department.
3. Cored intervals are recorded and published when wells reach non-confidential status.
4. Drill stem tests are recorded, and published when wells reach non-confidential status.

B. Well Completion Data

1. Surface casing size and length are published. Grade and weight, and details of production casing and tubing are recorded but not published.
- 2.3.4. Perforation, treatments, cement and plugs are recorded but not published.
5. Wildcat wells are allowed an initial five-day test period during which 1,250 barrels may be produced, after which the well MPR comes into effect, and details of production during such test are reported to the Department on the regular monthly production report. Total month's production for each well is published in the monthly Schedule of Wells.

C. Geological Information

1. Drill cutting samples, taken at 10 foot intervals from grass-roots to total depth, from all wildcat wells are required to be delivered to the Department. Cuttings only from sections sampled by the operator are required from field wells unless otherwise requested by the Department. All samples are washed, bottled, and are available for study by the public at the offices of the Department as soon as the well is released from confidential status. This information is included in the monthly Schedule of Wells at that time.
2. Geological markers are reported by most companies. Department geologists make independent picks of the markers in each well from electrolog, sample, and core examination. Markers are published in the monthly Schedule of Wells when a well is released from confidential status.
3. Cores from wildcat wells and selected field wells are delivered to the Department and are open to the public for inspection when the well reaches non-confidential status. Footages cored are published.
4. Geophysical maps for performance credit on Crown permits are filed in the Department and are confidential.

D. Reservoir Rock Properties

1. 2. 3. Copies of core analyses, giving porosity, permeability, and reservoir fluid saturation of reservoir rock are filed in the Department by the operators. This information is not published but is open for inspection after one year in the case of wildcat wells. For field wells the information is available on completion provided one year has elapsed since completion of the discovery well in the field.
4. Lithofacies maps are not supplied to, or prepared by, the Department.

E. Reservoir Fluid Properties

1. Pressure - Volume - temperature relationships, as reported by the Companies, are kept in confidential files by the Department. This information is not published and is confidential subject to the conditions outlined in Section D above.
2. Analyses of water taken from drill stem tests are made by the Department. These results are recorded and are available on non-confidential wells, but are not published.

Gas and crude oil analyses are not published.

F. Performance Data

1. Gas production is not recorded as no significant gas pressures have been encountered.
2. 3. 4. 5. Oil and water production is reported on a well and battery basis to the Department each month by the operators. Production of each well on a monthly basis is published by the Department in a Schedule of Wells. Salt water information has not been published but the information is available to interested parties who wish to examine the records.
6. Static pressure data is reported by the operators when obtained. The information is filed at the Department and is not published, but is available for inspection after one year.
7. Productivity data is recorded as supplied, but is not published.

G. Pool Information

1. Oil-water interfaces are established where possible on the basis of available data. This information is not published but is used in discussions with operators regarding MPR's. Gas-oil interfaces are not a factor in Manitoba at present.
2. Information on drive mechanisms is scanty but information pertaining to them is not confidential. Nothing has been published on this subject.

3. Performance predictions have not been made by the Department. Those received from the operators have been submitted in support of submissions for field M. P. R. 's. Figures received at public hearings are non-confidential.

H. Miscellaneous

Relevant to the above outline, the Manitoba Department of Mines and Natural Resources supplies the following information to the public:

1. An annual summary Schedule of Wells which includes the location, drilling date, final status, surface casing, elevation and total depth on all wells. Geological tops, cored and sampled, intervals, drill stem tests and production casing are given for field wells and wildcats which have been released from the confidential file. The monthly production figures for each well in the Province are tabulated.
2. A monthly supplement to the Schedule of Wells, which provides the above information for the past month.
3. Maps showing the location of all wells in the Province. The scale is one inch equals eight miles with field insets on a scale of one inch equals one mile. Current status of wells is indicated.
4. Generalized cross-sections and structure maps are in preparation and will be available in the near future.

ONTARIO FUEL BOARD

A. Drilling Information

All locations are accurately recorded, with elevation, and published annually as yet. We contemplate publication on a bi-monthly basis.

Since rotary drilling is used on only a few development wells, extensive records of such drilling operations are not required. The Board records only cored intervals and final drill stem test results.

B. Completion Data

Complete records are required from the Operator but only final production potential is published, annually. All such records remain confidential for 6 months at request of operator.

C. Geological Information

Drill-cuttings - samples are kept for intervals of each ten feet or less, and forwarded to the Geological Survey of Canada, where they are available for inspection after six months. Summary geological logs are published if available from the operator, otherwise a driller's log is published. Cores and geophysical control are not required.

D. Reservoir Rock Properties

Core analysis may be requested from the operators but remain confidential.

E. Reservoir Fluid Properties

Bottom-hole sample analysis rarely made as yet, and remain confidential. Representative water analysis are made by one operator, and results are available. Gas and oil analysis are done by Ottawa Department of Mines and Technical Surveys.

F. Performance Data

Gas and oil production by fields or townships is published annually. Pressures and flows are recorded annually for all gas wells and field averages are published.

G. Pool Information

The Board is not staffed to undertake reservoir or geological studies. Some work is done on reserve estimates, and figures on reserves are obtained from the operators.

H. Miscellaneous

The Ontario Fuel Board has only recently been set up and many decisions on policy and practice remain to be settled. As yet, publication of data is on an annual basis but the Board plans to publish a limited amount of data on a monthly or bi-monthly basis.

FEDERAL DEPARTMENT OF MINES AND TECHNICAL SURVEYS

The Department of Mines and Technical Surveys in Ottawa have limited information on Reservoir Data some of which constitutes duplication of Provincial Government and/or company records. With reference to the tabular headings of this report, the following comments may be made:

A. Drilling Information

No information recorded.

B. Completion Information

No information recorded.

C. Geological Information

1. Drill Cutting Samples: In order to carry on its work in regional subsurface correlation in Western Canada, the Geological Survey in Canada purchases washed samples from the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia. This procedure has been followed since the autumn of 1950 when the Survey established

These samples are stored at the Survey's office and are available for study by the public after release from confidential status. The Calgary office also has samples for a great number of wells drilled in Western Canada prior to establishment of that office including samples collected by the Federal Department of the Interior before transfer of natural resources to the respective provinces in 1930.

Drilling for oil and gas in the Northwest Territories is under the jurisdiction of the Federal Department of Northern Affairs and National Resources. Drill cutting samples from the N. W. T. are sent to the Survey's office at Calgary where they are available for examination after release from confidential status in accordance with regulations of the Department concerned.

Drill cutting samples from the Province of Ontario are received at the Survey in Ottawa by arrangement with the Ontario Department of Mines. These samples are washed and bottled in Ottawa and have been extensively used in the surface and subsurface mapping of southwestern Ontario carried on by the Survey for the past 20 years or more. A number of published Survey reports contain logs of wells and other logs are in the Survey files. The samples are available for study in Ottawa.

Samples resulting from drilling in Quebec are supplied to the Quebec Department of Mines and conformity with provincial regulations. However, for several years the Geological Survey of Canada has received unwashed samples of current drilling in Gaspé directly from the operating company. These samples are washed and logged and copies of the logs furnished to the company submitting the samples. In addition, the Survey has samples for a number of wells drilled in the St. Lawrence Lowland area of Quebec. Logs of a number of these wells have been published (G. S. C. Bull. 22, 1952) and the samples are available at Ottawa for study.

The Survey also received samples of several deep wells drilled in New Brunswick. These were received directly from the company that drilled the wells.

2. Geological Markers: The Geological Survey does not publish geological markers as such. However, logs of wells appear in a number of geological reports prepared by the Survey and such logs indicate formation boundaries.
3. Cores: Generally speaking, the Geological Survey has no cores resulting from drilling for oil and gas. There are, however, a few examples of cores having been donated to the Survey by individual companies particularly in Ontario.
4. Geophysical Control: The Geological Survey does not obtain geophysical contour maps submitted to provincial authorities in conformity with provincial regulations. Such maps are, however, furnished by companies applying for tax benefits provided under certain Federal legislation in connection with "deep test" wells. These maps are treated as confidential information. Indian lands

are subject to Federal regulations administered by the Department of Citizenship and Immigration. Geophysical and geological information received by that department is made available to the Geological Survey of Canada.

D. Reservoir Rock Properties

No information recorded.

E. Reservoir Fluid Properties

1. No information recorded.
2. Under Section E, item 2 - "Water, gas and oil analysis", considerable information is published from time to time on the results of analyses of Canadian crude oils. To date, the major part of this work has been done on Alberta and Ontario crudes, but the practice in the future will be to place more emphasis on Saskatchewan and Manitoba crudes. Each analysis includes distillation by the Hempel method, specific gravity, sulphur content, water content, colour, cloud and pour points, viscosity and carbon residue. Much basic research has been carried out on the Athabasca oil sands as well and results are on file at the Mines Branch, Ottawa.

F. Performance Data

No information recorded.

G. Pool Information

No information recorded.

INDUSTRY ASSOCIATIONS

Canadian Petroleum Association - relatively restricted reservoir data are available except generalized reserve estimates by areas that have been discussed by a reserves committee.

Canadian Oil and Gas Association - potentially a source of data for reservoir information in Eastern Canada.

Canadian Gas Association - has generalized gas reserve estimates and may have some more detailed information on Ontario areas.

Lloydminster Petroleum Association - has considerable detailed information on wells in Lloydminster district. Membership generally confined to Lloydminster operators.

American Petroleum Institute - has generalized data on Canadian fields.

NOT INCLUDED in this classification are scout associations -
(See Operators)

PUBLICATIONS AND SERVICES (not necessarily complete)

Canadian Institute of Mining and Metallurgy - publishes monthly bulletin in which carefully prepared technical papers on fields and areas are published on occasion.

Alberta Society of Petroleum Geologists - as above.

American Association of Petroleum Geologists - as above.

Society of Exploration Geophysicists - as above.

<u>Daily Oil Bulletin</u>)	
)	Prolific source of unofficial reservoir
<u>Myers' Oil News</u>)	
)	data presented somewhat haphazardly as
<u>Prairie Oil Scout</u>)	
)	news items.

Oil in Canada - Weekly publication giving technical paper abstracts and considerable unofficial detailed reservoir data.

Canadian Oil and Gas Industries - Monthly publication, as above.

World Oil - monthly publication, as above.

Petroleum Engineer - monthly publication, as above.

Oil and Gas Journal - weekly publication, as above.

Nickle Map Service - field and area maps.

Atlas Map Service - field and area maps.

Riley's Reproductions Ltd. - source of electric logs, radio activity logs, etc., on delayed dissemination basis.

Canadian Stratigraphic Service Ltd. - source of detailed stratigraphic information, drill stem test results and drill cutting samples by subscription.

Well Information Services Ltd. - maintains for its subscribers an active card file on wells from location to completion with summarized detailed information on delayed dissemination basis.

Reservoir Engineering Digest by S. Brodylo - provides comprehensive detailed Reservoir data in well organized presentation to subscribers.

Production Record by S. Brodylo - provides detailed production history on all fields in Alberta to subscribers.

OPERATORS

Western Canada Oil Scouts' Association - provides organized basis for exchange of much pertinent detailed reservoir data between its members.

Oil Pool Committees - these organizations exist for many of the larger oil fields and assemble considerable detailed information for the operating companies in the subject field.

APPENDIX - "H"

INTERPROVINCIAL PETROLEUM AND NATURAL
GAS COMMITTEE

STATISTICAL REPORT

1954

The oil and gas industry has, during the last year, continued to be a healthy and expanding segment of the Canadian economy. As a result of major capital investments new oil and gas discoveries have been made, additional pipe line systems constructed and further refining capacity made available.

During this period Canadian demand for petroleum products has continued its upward trend. Based upon data released by the Dominion Bureau of Statistics, Canadians in 1953 consumed approximately 515,000 barrels daily which, converted to an average annual per capita basis, equals 12.6 barrels per person. Comparison of these rates to a consumption of 224,000 barrels daily and 6.6 barrels per person which prevailed in 1946 indicates the tremendous change that has taken place in Canadian demand.

In spite of these rapid changes, Canadian per capita consumption is still considerably less than that of the United States. The gap however is narrowing since Canada's rate of increase in recent years has been greater.

Their operations of domestic refiners have supplied the major portion of Canadian demand. This has been possible through the very extensive refinery construction program which has been carried on in recent years. It has still been necessary however to meet a portion of the nation's requirements by importing refined petroleum products from the United States. In 1953 approximately 18 percent of total demand was supplied from this source.

Canadian refineries have been receiving an increasing percentage of their total crude supplies from domestic production. In 1953 this averaged 46 percent as compared to 10 percent in 1946.

This refinery market has, of course, been of major importance to western Canadian crude oil producers. Today western crude is being marketed in an area extending from the west coast of Canada to industrial Ontario, with small amounts being exported to the lakehead area of the United States. Refineries in the Maritime provinces and Quebec, however, continue to rely completely upon foreign sources. In 1953 this eastern area of Canada was responsible for 80 percent of the foreign crude imported into Canada.

Although it is gratifying to see Canada becoming more self sufficient, we must not overlook the fact that during this period western oil producers could have supplied considerably more oil had the market been available. For example Alberta, which at the present time has the vast majority of available supplies, only produced 65 percent of the potential production rate in 1953.

The characteristics of Canadian geography provide serious difficulties in extending our marketing area further east. The vast overland distance separating the Maritime provinces from present sources of supply in the west render this market unattainable. This same problem of distance, together with competitive factors place difficulties in the way of penetrating the Montreal refining centre.

One bright aspect to this problem is the anticipated market for Canadian crude in the United States. It is expected that in the near future crude oil will be exported to the northwestern area of the United States. Construction plans are also underway whereby medium gravity crude from Saskatchewan will move into the Minneapolis area.

Despite these problems companies continued to spend large sums of money in exploratory and drilling activity. Important discoveries such as Pembina, Sturgeon Lake, Smiley, and Roselea have been made. Crude oil and natural gas liquid reserves in western Canada were estimated to be 2.0 billion barrels as at the end of 1953. The ratio of reserves to 1953 production was 25 and the ratio of reserves to 1953 Canadian demand for crude and products was 11.

Developments in the Canadian oil and gas industry during 1953 and 1954 are presented in summary form below.

Demand for Crude Oil and Products

The 1953 daily Canadian demand for crude oil and products was approximately 515,000 barrels. Estimates for the current year are 8.5 percent greater, thus constituting an average daily requirement of 560,000 barrels.

Supply of Crude Oil and Products

In 1953 approximately 18 percent of total demand was satisfied by imported petroleum products. Refinery runs of domestic and foreign crude accounted for 38 and 44 percent of total demand. Estimates for 1954 are 17 percent for imported products, 45 percent for domestic crude and 38 percent for foreign crude. This in effect reverses the relative position of domestic and foreign crude.

Refinery Operations

During 1953 additional investment was made in Canadian refining capacity. Total capacity was increased by approximately 16 percent with the most significant change taking place in the British Columbia area. Changes scheduled for 1954 and 1955 will increase the nation's capacity to approximately 576,000 barrels daily.

AVERAGE DAILY REFINING CAPACITY IN CANADA

	<u>1946</u>	<u>1948</u>	<u>1950</u>	<u>1952</u>	<u>1953</u>	<u>1954-55</u>
British Columbia	21,800	26,650	28,850	28,350	50,850	53,500
N. W. T.	840	1,100	1,250	1,250	1,250	1,250
Alberta	17,300	35,750	46,900	68,000	69,150	81,550
Saskatchewan	18,175	26,475	33,575	50,300	58,100	63,100
Manitoba	4,500	4,500	7,800	19,700	20,000	27,500
Ontario	77,950	88,700	75,200	104,500	135,000	135,000
Quebec	71,000	107,000	143,000	164,000	176,000	196,000
New Brunswick	300	300	300	300	300	300
Nova Scotia	34,000	25,000	22,000	22,000	18,000	18,000
Canada	245,865	315,475	358,875	458,400	528,570	576,200

(Source of information: Dominion Bureau of Statistics, Industry Periodicals)

Pipe Line Construction

Two important additions were made to pipe line facilities during 1953. The 715 mile Trans-Mountain Pipe Line extending from Edmonton to Vancouver was completed. The first oil delivered to the Vancouver area via this line arrived in October. Initial throughput capacity is 120,000 barrels daily but present rates are considerably lower.

In 1953 the Interprovincial Pipe Line Company completed an extension from Superior, Wisconsin to Sarnia, Ontario. This change enables the Sarnia refinery area to be supplied by western crude on a year-round basis, thus avoiding the previous problems associated with freeze up of the Great Lakes.

CANADIAN PIPE LINE MILEAGES AND CAPACITIES

<u>Crude Trunk Lines</u>	<u>Mileage at End of 1953</u>	<u>Capacities Barrels per day</u>	<u>Areas Served</u>
Interprovincial	1,754	165,000 Out of Edmonton	Alberta, Sask., Man., Ontario & U. S. A.
Trans-Mountain	711	120,000 Out of Edmonton	British Columbia
Transit and Storage	151	46,000 Out of Cygnit, Ohio	Sarnia, Ontario
Portland-Montreal	236	149,000 Out of Portland, Maine	Montreal, Quebec
Trans-Northern *	442	40,000 Out of Montreal	Ottawa (branch line), Toronto, Hamilton
Sarnia Products *	188	39,000 Out of Sarnia	Hamilton, Toronto
Sun-Canadian *	200	17,500 Out of Sarnia	Toronto, London, Hamilton
Totals	<u>3,682</u>	<u>576,500</u>	

* Product pipe lines

Reserves of Crude Oil and Natural Gas Liquids

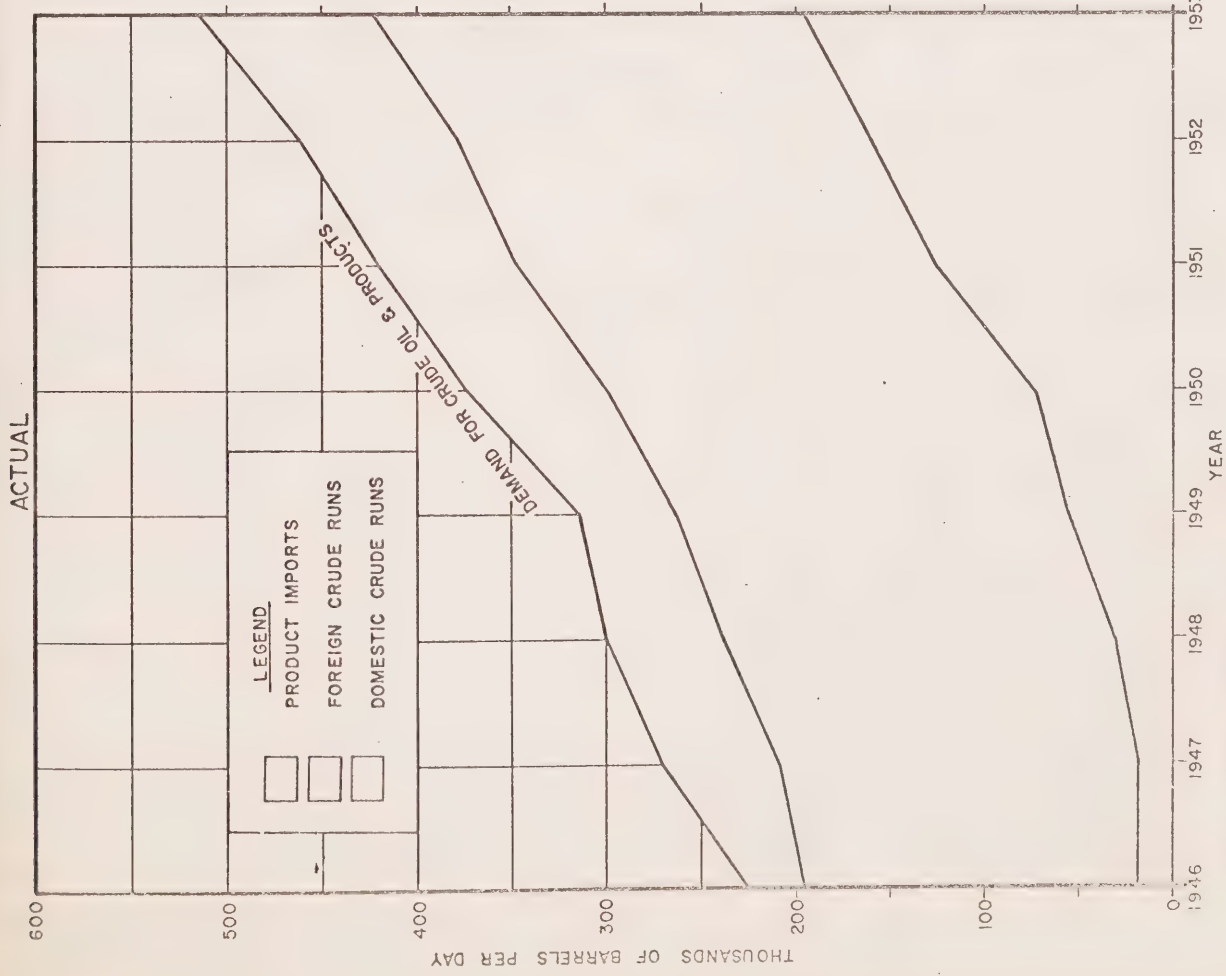
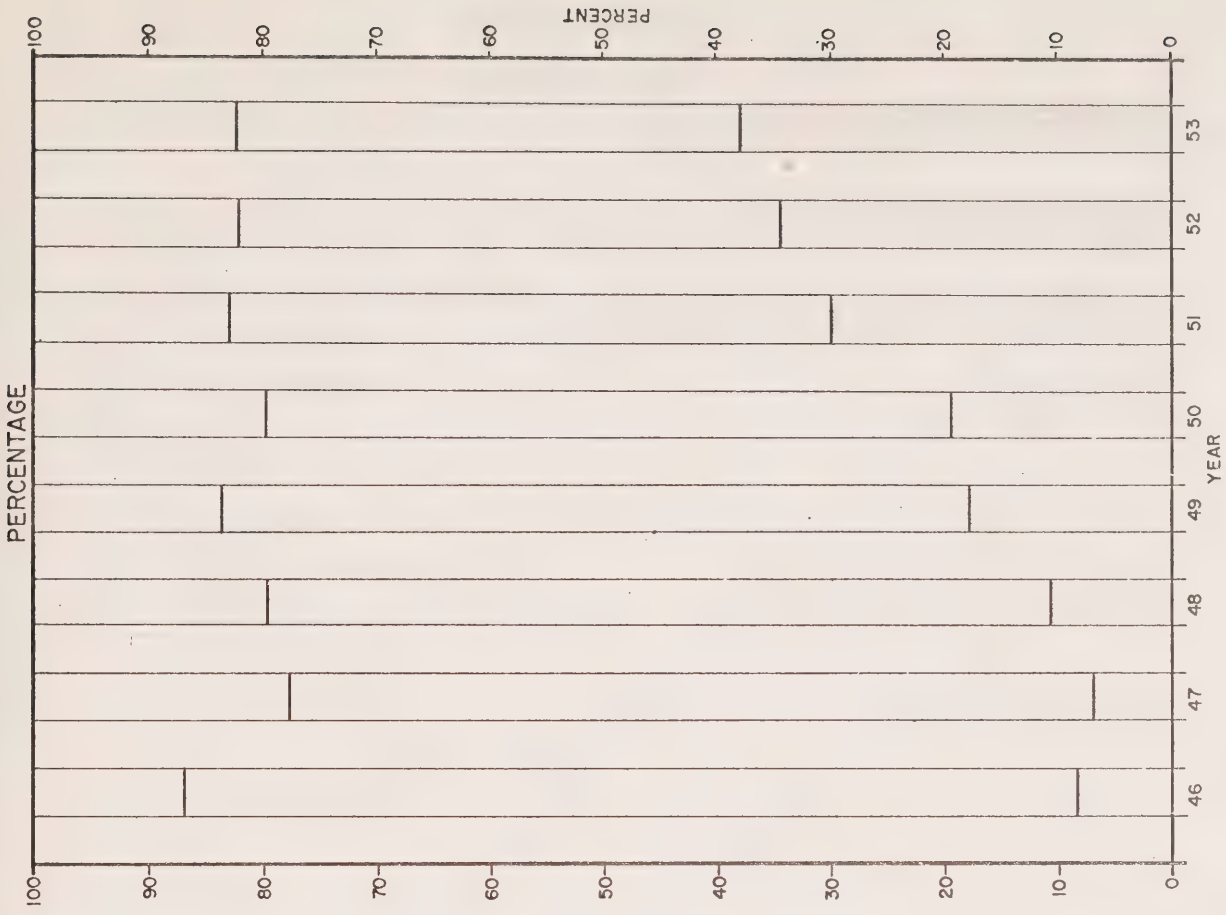
Net recoverable reserves in Western Canada increased by 297.2 million barrels during 1953. An additional 81.8 million barrels were produced thus providing a gross increase in reserves of 379.0 million barrels. This constitutes a rate of discovery of 4.6 barrels for each barrel produced during the year.

Exploration and Development

Geophysical and drilling activities in western Canada are continuing at record rates. Total footage drilled increased from 8.3 million feet in 1952 to 9.3 million feet in 1953. During this period activity in Alberta actually declined, however, the increase in exploration and development in Saskatchewan and Manitoba more than compensated for this decrease.

DEMAND AND SUPPLY FOR CRUDE OIL AND PRODUCTS

1946-1953

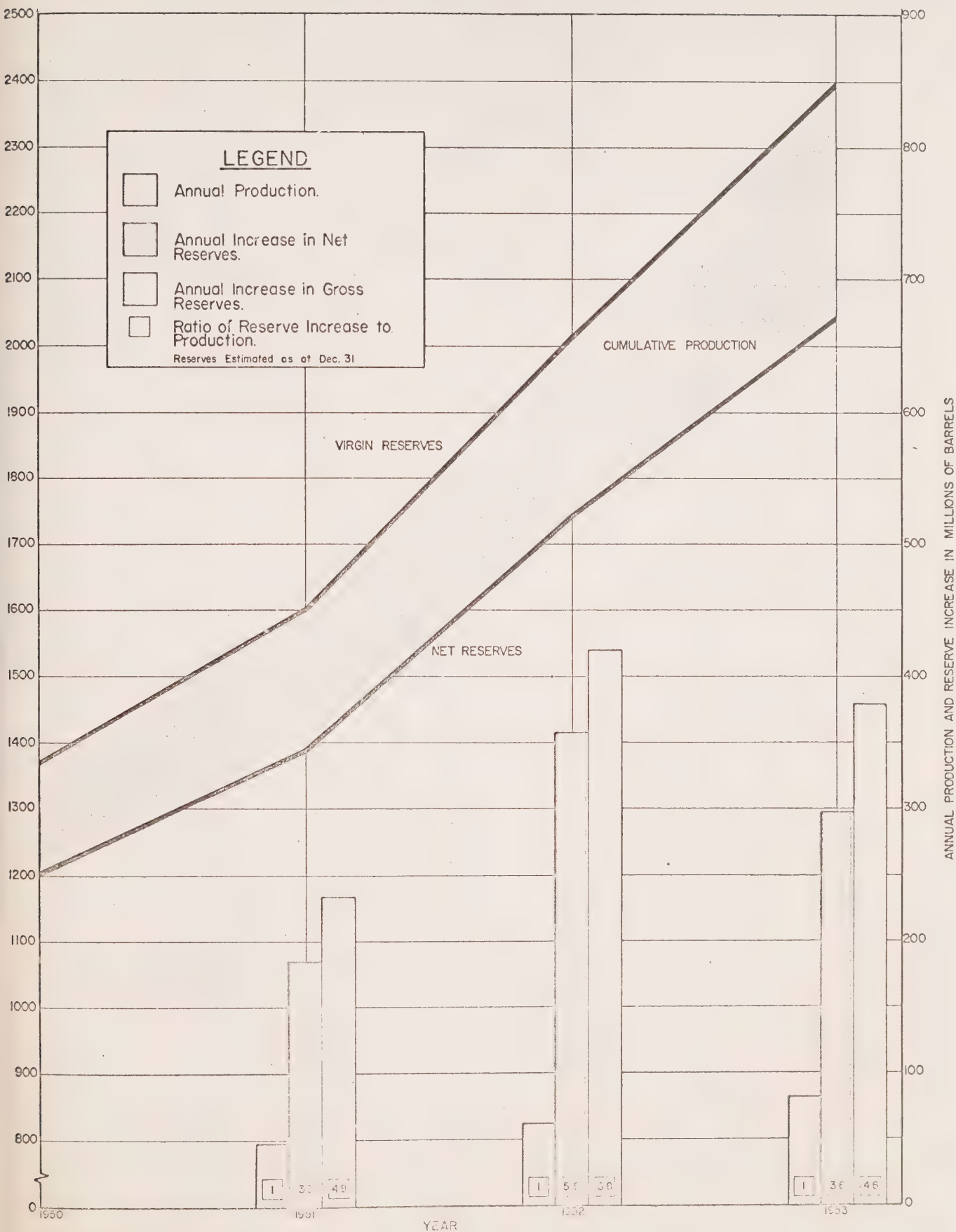


SOURCE: DOMINION BUREAU OF STATISTICS
PREPARED BY P.&N.G.C.B. OF ALBERTA

WESTERN CANADA

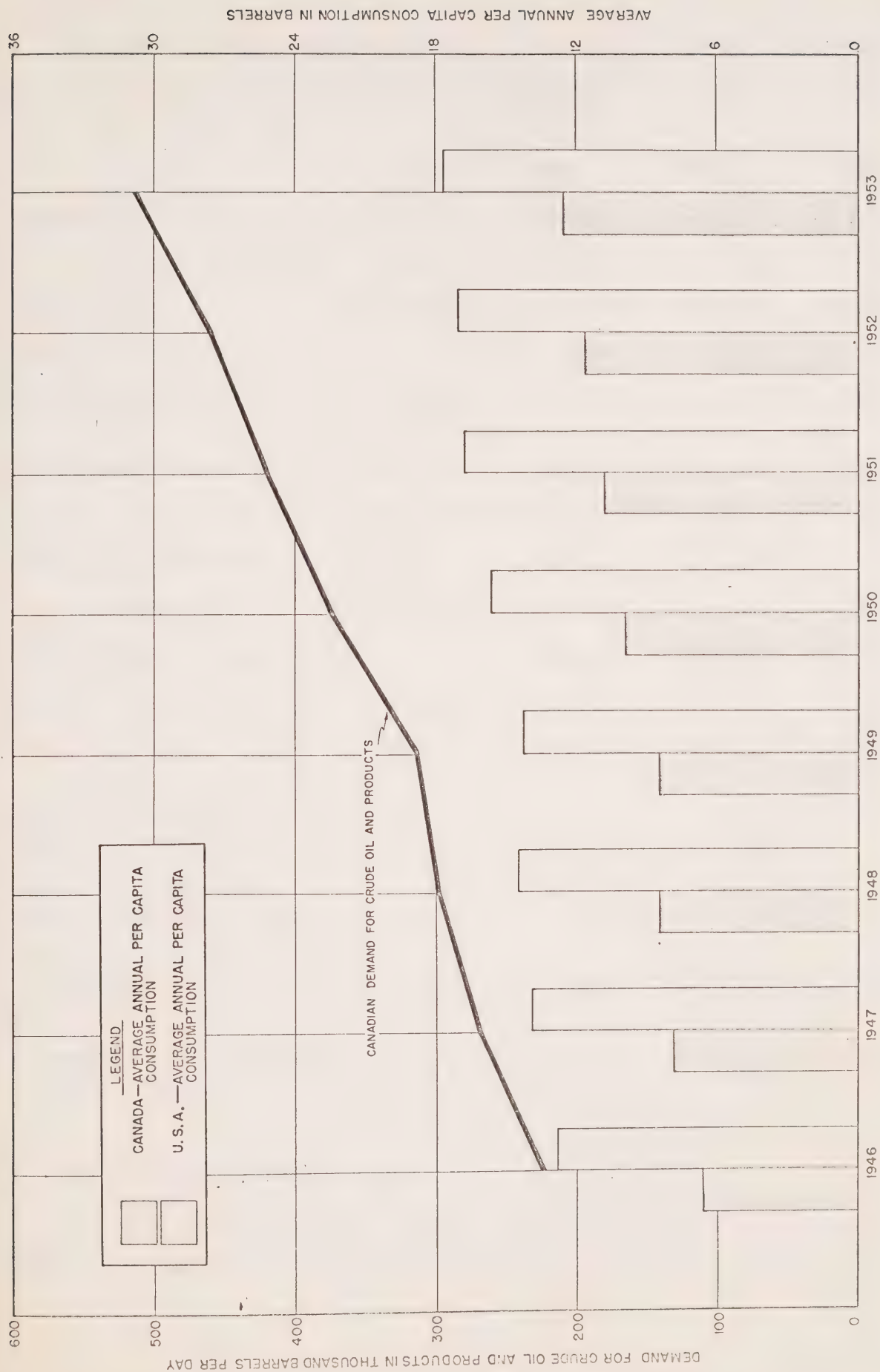
CRUDE OIL & NATURAL GAS LIQUID RESERVES

1950-1953



SOURCE: THE CANADIAN PETROLEUM ASSOCIATION.
PREPARED BY P. & N.G.C.B. OF ALBERTA

1946 — 1953



SOURCES: DOMINION BUREAU OF STATISTICS
 U.S. BUREAU OF MINES, U.S. BUREAU OF THE CENSUS
 PREPARED BY: P. & N. G. C. B. OF ALBERTA.

WESTERN CANADA CRUDE OIL AND NATURAL GAS LIQUID RESERVES
AS AT DECEMBER 31
(Thousands of Barrels)

	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>
<u>Alberta:</u> Crude Oil	1,165,000	1,328,000	1,526,389	1,624,496
Natural Gas Liquids	(x)	11,000	65,374	198,126
<u>Saskatchewan</u>	10,300	21,000	124,247	182,159
<u>Manitoba</u>	--	500	2,106	10,890
<u>Northwest Territories</u>	27,300	27,100	26,767	26,442
 Total Western Canada	 1,202,600	 1,387,600	 1,744,883	 2,042,113
 Net Increase in Reserves	 --	 185,000	 357,283	 297,230
Annual Production (*)	28,996	48,249	62,083	81,815
Gross Increase in Reserves	--	233,249	419,366	379,045
Cumulative Production (*)	162,677	210,926	273,009	354,824
Virgin Reserves	1,365,277	1,598,526	2,017,892	2,396,937
 Ratio of Annual Increase in Net Reserves to Production		3.8	5.8	3.6
 Ratio of Annual Increase in Gross Reserves to Production		4.8	6.8	4.6
 Ratio of Net Reserves to Production	41.5	28.8	28.1	25.0
 Ratio of Net Reserves to Total Canadian Demand for Crude Oil and Products	8.8	9.1	10.3	10.9

(x) Not reported December 1950

(*) Crude Oil & Natural Gas Liquids

Source: The Canadian Petroleum Association

APPENDIX - "I"

"CURRENT TRENDS IN THE MINERAL INDUSTRY"

a contribution of

ONTARIO MINING ASSOCIATION

presented by

DR. H. J. FRASER,
Vice-President and General Manager,
Falconbridge Nickel Mines Limited.

Mr. Chairman, Honourable Ministers, Gentlemen:

It is a privilege and pleasure to review for you the current trends in the Canadian Mineral Industry, with special emphasis on recent developments of apparent major importance. Special attention will be given to the metallic and non-metallic minerals; discussion of developments in the field of fuels will be left to others.

During the past decade, developments in our industry have been so phenomenal that perhaps many of us, privileged to be actively engaged in the industry, have not been fully aware of the extremely significant changes taking place. Since 1945, the Canadian economy has changed from shortage to self-sufficiency with respect to the fuels - petroleum and natural gas, the "sinews of industry" - iron-ore, and a major future source of energy - uranium. In addition, there have been discoveries and developments of major importance concerning nickel, copper, lead and zinc, titanium and asbestos. While these developments have already been a strong stimulant to many phases of our economy, they form the basis for great future industrial progress in Canada and further strengthening of the Canadian position in international affairs.

In attempting a critical appraisal of the principal current trends, it is as well to begin by examining the statistical record. The record shows that during 1953 the mineral industry as a whole, (but excluding uranium), again reached a new peak in the dollar value of production, namely \$1.331 billion, an increase of 3.6 per cent over the total of the previous year, which itself had established a new record. Its net value of production thus ranks next to agriculture, the leading Canadian primary industry. Although the value of mineral production is a quarter to a third that of agriculture, it in turn is about double the net value of each of the next two ranking primary industries, forestry and electric power.

For purposes of statistical analysis the mineral industry is broken down into four major groups, namely, mineral fuels, metallic and non-metallic minerals and mineral structural materials. The position by groups is as follows:

<u>Group</u>	<u>1953 Production</u>	<u>Percentage change from 1952</u>
Metallic Minerals	\$708,912,835	minus 2.6%
Mineral fuels	311,235,192	plus 18.1%
Mineral structural materials	183,605,851	plus 8.8%
Non-metallic minerals	127,457,625	plus 1.9%

As might be anticipated, the greatest increase in dollar value of production was registered in mineral fuels. Some decline in coal output was more than offset by the greater production of natural gas and crude petroleum, which jumped by \$55 million above the recorded value for 1952. Indeed, crude petroleum, valued at \$198 million, for the first time took the lead over any other mineral produced in Canada. Our output of mineral fuels has doubled in value since the discovery in Alberta of the Leduc field in 1947 and the Redwater field in 1948 and now is clearly the most rapidly expanding segment of the industry.

Products classified as "other non-metallic minerals" were valued at \$127 million or double their 1949 value. The increase of some \$2.4 million in 1953 over the previous year was due chiefly to much enlarged values of barite and titanium dioxide production. In other products of this group there was little change. Asbestos production at \$87 million fell slightly both in quantity and value.

The next group, structural materials, (which includes lime, cement, clay products, sand, gravel, stone and slate) established a new high at \$183 million, reflecting the continuance of strong demand and activity in the construction industry.

Metal production, with which this paper will be chiefly concerned, amounted in 1953 to \$709 million, compared with \$728 million in 1952, or a decrease of 2.6 percent. Nickel, with an output valued at \$160 million, took first place as a dollar earner, with copper next at \$151 million. Gold, which has held first place for so many years, dropped to third place with \$140 million. It must be recalled, however, that gold production was adversely affected by prolonged strikes in a number of the Ontario gold mines. Lead and zinc both registered increased volume of output, lead by 14 percent and zinc by 7 percent, but both metals were drastically affected by price declines. Iron-ore shipments of 6.5 million tons, with a value of \$43 million, were the highest on record but should show more rapid increases in the immediate future.

The provincial production pattern reflected chiefly the growing activity in Alberta oil. Ontario, Quebec, Alberta and British Columbia together accounted for some 84 percent of the Dominion's production. The relative position of the provinces (other than Alberta) has not changed as much during the past few years as has the total production. In other words, the growth has been spread fairly evenly.

MINERAL PRODUCTION BY PROVINCES - 1953

(excluding pitchblende products)

<u>Area</u>	<u>Value in \$ Million</u>	<u>Percentage of total</u>	<u>Change from 1952</u>	<u>Major Minerals Produced</u>
Ontario	460.5	34.6	nil	Nickel, gold, copper <u>sand & gravel, iron-ore</u>
Quebec	252.8	19.0	minus 2	Asbestos, gold, copper, zinc, silver, lead
Alberta	246.0	18.5	plus 3.2	Crude, petroleum, natural gas, coal, clay products
British Columbia	160.7	12.1	minus 1.1	Zinc, lead, copper, silver, gold, iron
Nova Scotia	67.1	5.0	nil	Coal, gypsum, barite, salt
Saskatchewan	48.1	3.6	minus 0.3	Copper, zinc, coal, gold, min. structural materials
Newfoundland	33.7	2.5	nil	Zinc, iron-ore, lead, Fluorspar, copper
Manitoba	25.7	1.9	minus 0.1	Copper, gold, zinc, mineral structural materials
Yukon Territory	14.4	1.1	plus 0.2	Silver, lead, gold, zinc, coal
New Brunswick	11.7	0.9	nil	Coal, gas, crude petroleum cements & stone
N.W. Territories	10.5	0.8	plus 0.1	Gold silver, crude petroleum
	<u>1,331.2</u>	<u>100.0</u>	<u>0.0</u>	

In summary then the statistical record reflects the rapid expansion of mineral fuels, particularly petroleum, the increasing importance and value of other non-metallic minerals, the sustained demand for structural materials, the expansion in nickel production and the iron-ore industry, the adverse effects of reduced prices on lead and zinc and the continued difficulties of coal and gold mining operations, the latter aggravated by prolonged labour stoppages in Ontario.

Current Developments in the field of Metals

At a time when capital outlays are reported as being reduced in certain Canadian industries, it is encouraging to note that capital expenditures in the mining industry in 1954 are likely to reach new levels, as compared to \$276 million in 1953 and that these expansive activities are so widespread as to affect favorably almost every part of Canada.

Exploration activities were likewise widespread geographically, with particular attention to the base metals, industrial and non-metallic minerals. More and more, the majority of exploration parties are placed in the field by companies rather than individuals. This trend inevitably results from the increased cost of supplying and maintaining a field party, the replacement of the bona fide prospector by a salaried geologist, engineer or technician, and the increasing use of modern but expensive prospecting

tools such as geophysics, diamond drilling and aerial transportation.

Another trend worthy of note is the growing knowledge concerning mining in the northern part of the country. The pioneering work of the Yukon succeeded by the modern approach at Great Bear Lake, Keno Hill and around Yellowknife. Now we see the rapid development in the Beaverlodge area and the work at Rankin Inlet, not to mention the major project on the Quebec-Labrador border. All of this development clearly suggests that the north is slowly coming into its own from a mining standpoint.

Nickel

The nickel industry is responding with great energy to the sustained and urgent demand for its product. In 1953 the Sudbury district production reached a new peak in tons of ore (14,965,116) and nickel production at 143,966 tons of metal was just under the alltime peak reached in 1943. Commercial demand for nickel has continued at a high level. In addition, deliveries for stockpiling are now being made as a result of contracts signed in the past two years or so.

Although exploration has been pursued actively in Canada and elsewhere, no new major find of nickel-bearing sulphide has been reported. Recent major developments have been mostly metallurgical. A new producer (Sheritt Gordon) has now entered the field with mine production at Lynn Lake, Manitoba and a refinery, embodying a new metallurgical process, operating at Fort Saskatchewan, Alberta. International Nickel Company is building a metallurgical plant designed to recover iron and other by-products from low-grade pyrrhotite. Falconbridge is building a pilot unit for treatment of pyrrhotite.

Production of nickel from the Cuban laterites is now reputedly a metallurgical and financial success and will be expanded. Substantial production from foreign lateritic ores could and probably would have an important bearing on the future of the Canadian nickel industry.

Copper

About one-half of Canadian copper production is a by-product to nickel mining and the remainder is chiefly from the Noranda, Flin Flon and Southern British Columbia districts. The price of copper remained relatively steady during the past year, as did production. Two new developments of substantial importance are under way. In the Gaspé area, under the guidance of Noranda, a new mill and smelter with a rated capacity, of 2,400,000 tons a year are being constructed to treat the ore body reported to contain 67 million tons of 1.3% copper. Production is expected by 1955, whereupon a major new producer will join the industry. Another important development is taking place in the Chibougamau district of northwestern Quebec, where the Opemiska operation has started production, the Campbell Chibougamau group and others are being prepared for production. Presently reported reserves in these properties are of the order of 4,000,000 tons at 3%. Deposits of promise are being examined in northern British Columbia (Granduc) and also from Central Ontario (Geco).

Lead and Zinc

The lead and zinc industry has continued to be severely handicapped by the reduced prices of these metals and the overhanging threat of increased tariff rates in our principal market, although this latter threat has temporarily been remedied. Many of the smaller producers in British Columbia and elsewhere have sharply curtailed or suspended production. If and when these difficulties are surmounted, the groundwork is laid for resumption of maximum production and the development of important new ore bodies.

Within the last two years we have had striking evidence of the drastic change that can take place, both with respect to given source of metal and the relative importance of certain areas in our mineral districts. In two new areas, namely the Bathurst area of New Brunswick and the Manitouwadge area of western Ontario, there have been found and proven base metal deposits of sufficiently large tonnage and of such grade as to increase very substantially our known Canadian reserves of lead, zinc and copper. In both areas production plans are already well advanced. Both have the advantage of being close to established means of communication. In New Brunswick the indicated tonnage in two deposits is of the order of 60 million at 7% combined metals. The Manitouwadge area is less well known but already appears to have some 15 million tons of 5% copper-zinc ore containing appreciable values in silver. We should also mention the developing picture in the Pine Point area where continued drilling and exploration of these deposits clearly indicates that they are of major importance for the future.

It is difficult to overrate the importance of these discoveries, not only for the actual value of the mineral wealth disclosed and the accompanying economic activity which their development generates, but also for the psychological effect and renewed impetus which they give to exploration.

Iron-ore

The picture of Canada's expanding iron-ore industry is one of great stimulus and encouragement. Production self-sufficiency on a tonnage basis was achieved during 1953, although cross shipment of ores of special composition still continues. In Ontario, development of major deposits in the Steep Rock, Michipicoten and Marmora areas continues with Ontario production expected to rise steadily for the next few years. Aggregate estimated reserves in these three districts is of the order of one billion tons of commercial ore.

The large project for development of the New Quebec and Labrador iron-ore area came to fruition in 1954 and will now move toward its goal of 10 million tons production a year. Proven reserves are already about 417 million tons of high grade ore. No less important than the actual production is the fact that a vast new territory known to be rich in a variety of minerals is now opened up to closer examination and served with means of rail transportation. It will be most surprising if other metal deposits of major importance are not found in this great area.

The rate of production from Newfoundland's Wabana area was nearly doubled in 1953 when 2,680,000 tons were hoisted. The general area has been estimated to contain from 4 to 10 billion tons of ore.

In British Columbia, production reached a new peak of almost one million tons in 1953, chiefly from the Argonaut and Texada mines, the former being British Columbia's first entry into the iron-ore business.

Canada is moving very rapidly into the position of a major world producer of iron ore, thus reflecting another fundamental change that is taking place in our mineral economy.

Uranium

Of no lesser importance and significance are the developments in the uranium field. Two areas of major importance, one new, the other relatively new, are now much in the public eye.

The Beaverlodge area of northern Saskatchewan now has a second producer which, incidentally, is the first operated under private ownership. A second and large-scale private producer is very well advanced with production plans. Several other properties in the area show real promise of future production. Aggregate ore reserves in the district appear large.

In Ontario, the Algoma or Blind River district has responded in a spectacular manner to exploration. Ore reserves are reported in the order of several hundred million tons. The grade is low (something over one pound to the ton) but production plans now under discussion are of the order of 6 thousand tons a day from three or more producers. Discovery of uraniferous ores in many other parts of Canada indicates the widespread possibilities of finds of economic value, some of which are now potential producers. While the economy of uranium is still dependent on governmental policy, the reserves being discovered must astound all but the most optimistic.

Gold

It would be pleasant if, after so many years of difficulty, it were possible to give an optimistic report on the gold mining industry and its prospects. It is with regret that we have to record that there seems to be little hope of radical improvement in sight as yet. Our lode gold producers are now reduced to 57. Most of them depend for continued operation on governmental assistance. Labour stoppages in Ontario in the second half of 1953 and the early months of 1954 aggravated the difficulties of a number of Ontario producers. Considering all the circumstances, gold operators have continued to perform magnificently in the face of most adverse circumstances. With government assistance, they have doggedly continued, too often with inadequate returns to maintain their payrolls and the communities which depend on their operations. Failing what appears to be an improbable development in the near future, viz. an increase in the gold price, no opportunity must be lost to impress upon government authorities and public opinion generally the root causes of the difficulties which the industry continues to experience.

Needless to say, in the face of such economic problems, the exploration for new gold orebodies has virtually stopped. Around operating properties exploration continues at only a very modest pace and then usually only as a side issue. Nothing of spectacular interest can be reported, although it perhaps should be mentioned that the Kerr-Addison mine of Ontario is but a short distance behind Homestake which holds top position as the largest producer in North America.

Non-metallic and Industrial Minerals

By far the most important member of this group is asbestos. In 1953, British Columbia entered the field when production started at the Cassiar. Plans are laid for bringing a new property into production in the Eastern Townships area of the Province of Quebec. The established producers are engaged on sizeable expansion programs so the industry continues in a healthy condition.

In general it may be anticipated that industrial minerals such as salt, gypsum, sulphur, fluorspar, magnesite and quartz, to mention but a few of this important group, will become an increasingly important section of the Canadian mining industry, both in volume and variety of output. It is interesting to note that a shaft is now being sunk near Windsor for the first underground salt mining in Ontario. Likewise worthy of mention is the substantial increase in sulphur by-products in the Sudbury district and installation of a plant in the Niagara Peninsula for recovery of sulphur products from Quebec pyrite.

Future growth of the structural minerals such as sand and gravel, limestone and its by-product cement, will, of course, be closely related to the ups and downs of the construction industry, but the dollar value can be expected to regularly increase.

Other Metals and Minerals

It is impossible, within the limits of this paper to do more than touch upon a number of metals, important as many of them are, such as aluminum, tungsten, platinum and palladium, silver, cobalt, magnesium, cadmium and titanium, to mention but a few. The steady progress of metallurgical science and the requirements of such inventions as jet propulsion are constantly bringing a new value to metals which previously did not rank particularly high in importance. With many of these Canada is well endowed, and their growing development and production will add to Canada's wealth and increase our status as a producer of strategic metals and minerals.

Ancillary Economic Activities

The importance of Canada's mining industry cannot be judged solely in terms of the volume and variety of metal and mineral output. While the primary object of a mine is to bring into being new wealth, mining inevitably generates many other forms of economic activity. Mining has recently been responsible for the construction of a new 142 mile railroad into northern Manitoba and a 360 mile railroad joining the New Quebec-Labrador iron-ore deposits with the shipping base at Seven Islands. A railroad is to be built into the Chibougamau district and rail extensions will be required to serve the Manitouwadge area of Ontario.

The oil and gas industry developments leading to the pipelines east and west from Alberta and now to the proposed eastern gas line have given rise to financial and construction projects of major importance.

Similarly, with hydro-power developments, which range across the continent from the gigantic project at Kitimat and the proposed development in northern British Columbia and the Yukon to service a new metallurgical industry, to the expansion of power facilities in eastern Canada, to provide for the needs of Labrador iron, Gaspe copper and many other new mining programs.

It is perhaps unnecessary to reiterate how large a proportion of new capital investment is devoted to the purchase of machinery and supplies and to the building of new plants and townsites with all the construction activity which these represent.

Employment

The significance of the industry in the overall economy of this country may also be seen from the employment which it affords to Canadians. In metal mining and smelting 67,560 persons were employed in 1950; by 1953 the figure had risen to 74,000. Corresponding figures for the Canadian mineral industry as a whole are 120,000 in 1950 and 128,500 in 1953. These figures, of course, relate only to those directly employed. When their dependents are added and the figure multiplied several fold to include secondary employment resulting from other activities related to and created by mining, one can only conclude that mining ranks among the top Canadian industries in sustaining the payrolls of Canadians.

Exports

Of equal importance to the economic welfare of Canada is the maintenance of our export trade.

In 1953, \$731 million worth of ores, primary metals and minerals were exported from Canada, an increase of about \$10 million from the previous year. This compares with total production during the year of \$1,331 million including fuels or \$1,020 million for the metallic, non-metallic and structural materials groups alone. Our export of minerals was thus approximately 18 percent of the total value of our export trade, and stands third in rank, exceeded only by pulp and paper and farm products, among Canada's export industries.

Some of the more important individual metal exports are given below. By way of comparison, the value of nickel exported is approximately one-quarter that of wheat, the leading export commodity. It must be emphasized that the export figures given are for primary metal and semi-fabricated material, with the exception of asbestos, which is unmanufactured material only. Aluminum, of course, is all derived from imported bauxite ores.

LEADING MINERAL EXPORTS - 1952

(Value in dollars - 000's omitted)

<u>Metal</u>	<u>1952 Production</u>	<u>1952 Exports</u>	<u>Rank amongst all exports</u>
Aluminum	-	\$155,106	5th
Nickel	\$151,349	150,982	6th
Copper	146,679	100,806	9th
Zinc	129,833	96,283	10th
Asbestos	89,255	86,510	12th
Lead	54,671	49,676	17th

While such export figures may be a source of satisfaction as to our ability to produce and sell, they also point up the fact that we are much dependent on foreign markets and our progress toward utilizing our mineral products within the country is still slow and far short of achieving a balance.

Operating Costs

Serious warnings have been issued on many recent occasions by bankers and economists of the dangers which beset a "high cost economy" in an increasingly competitive world. This is particularly applicable to the mining industry where increased costs of operation eliminate tonnages of what might otherwise be ore of economic grade. In addition, deposits have to be sought in more remote areas where additional costs for transportation and other items are inevitable. The welfare and progress of the industry, as well as its ability to raise capital on the substantial scale required, could be quickly retarded by continued inflation of operating costs. There is real danger that we may let our spectacular postwar growth affect our perception of reality.

Canada has no monopoly as a metal-producing country. Like other Canadian industries, the mining industry is facing, and will face, increased competition from other producers in other countries, and particularly from those countries which lack industrial development and thus have a low average daily wage. It is of the greatest importance that this factor be borne in mind both by those authorities which determine our levels of taxation and those organizations which negotiate with companies on the largest single item of costs, namely wage rates. In particular, there is very real danger in the attempt to fasten on the primary industries of this country, a level of wage rates which may be suitable for a thoroughly industrialized economy like that of the United States but which is not suitable to the different conditions which obtain in Canada, where we are at a different stage in our national evolution. We must realize the competition we now face from abroad where all concerned with industry have learned the hard way that they must export to eat and have adjusted or are adjusting their economy accordingly.

Likewise, we must be on guard against foreign attempts to keep our industry on an intermittent basis through purchasing our exports in times of emergency and prevention of export by tariff action in times of restricted business and general unemployment.

The mining and mineral industry has played a primary role in the development of Canada. It is clear that for many decades to come, it can make an ever-increasing contribution to the growth and welfare of this country. It is assisted admirably in its task by many important services furnished by provincial governments and the federal government and operates under some of the most enlightened legislation in the world. But the industry itself and the governments, which, in effect, are a partner in its development, must continue their vigilance in combatting those factors which tend to hamper its further progress.

APPENDIX - "J"

"THE PROBLEMS OF MINE-MAKING IN THE FAR NORTH"

a contribution of

QUEBEC METAL MINING ASSOCIATION

written by

W. H. DURRELL,
General Manager,
Iron Ore Company of Canada

presented by

A. G. BALLACHEY,
President,
Quebec Metal Mining Association

Mr. Chairman, Honourable Ministers, Gentlemen:

Possibly the most appropriate opening for this paper is a simple question: Are we doing enough to encourage the development of our mining resources? And the corollary to this question might well be: Are we doing the right things, or are we doing things in the right way?

"We" means every Canadian Citizen. "We", the people, act through our governments, federal and provincial, and the function of these governments is to translate into action the wishes of the people. But the people as a whole do not state the precise terms of government policy. They express a general wish. Their government then endeavours to give voice to that wish through executive policies with which you are all familiar.

Now the man whose profession is to develop natural resources has, in a sense, a dual role. He is one of The People. But he has a very special interest of his own, as well. He wants the fewest possible curbs on what he does, or perhaps I should say the greatest degree of legal and rule-making encouragement for it. Therefore, it might be very detrimental to the public interest if mine-makers were to write the rules by which they work - just as it would be bad for society as a whole if a body of farmers wrote out laws on agriculture, or railroad executives had the final say regarding all facets of transportation. The common good must be protected in all legislative action. Nevertheless I think it fair to say that in each field the man who has to do the job, and is confronted by its special problems, acquires a wealth of practical knowledge which can be translated into terms of the general welfare of the country. In this way he has a contribution to make to national progress, just as governments have as representatives of all the People.

Governments and mining men are partners in the development of Canada. The one group represent the People, the other group represent the capital required to open up the undeveloped mineral resources. This joint responsibility is the reason for the observations which I make today in the dual role of Canadian citizen and mine developer.

The cost of bringing new mines into production in our country has risen tremendously during the past few years. Everything we use in the way of labour, equipment and supplies costs a great deal more than formerly. That is true of all development, whether in remote areas or close to the routes of general travel. In distant parts, however, the rise in costs has been such as to make many developments which should be undertaken in the national interest, virtually prohibitive. The cost of conducting mining exploration is pyramided by climate and distance. As we go farther and farther north the short exploration season keeps shortening, until we reach a point where it is restricted to no more than three months in twelve. Because of the greatly increased distance it costs more to take a man to the place where he will work, more to supply him with tools when he gets there, more to feed him, more to move him by airplane, more for everything he will need and use while working at great distances from his nearest base "outside". This is a fact well known to all and it is the result of remoteness. Yet what we are all trying to do, basically, is to open the country, so that places now remote from what was until comparatively recent times our narrow corridor of settlement along the border, will no longer be remote. The concern of all of us, in short, is really to enlarge Canada.

The problem of cost goes far beyond the early exploration stage. It applies, in fact, through all the development period. If a property, or an area, is worthy of major development the mine-maker is soon confronted by the problems of transportation and hydroelectric power, of virtually everything required to energize his program. Before his principals will be prepared to make the capital outlay required, not for actual mining but for getting the men and their tools to the job, they must first see some of the answers to these required expenditures in terms of the future security of their investment, with due allowance, of course, for the risks they are called upon to take. At present the risk capital required for the exploration and development of properties in remote areas has little chance of commensurate return under prevailing conditions unless the discovery is of such obvious importance as to guarantee that the returns will be there, following the huge expenditures which must be made.

My first suggestion, then, is that a property, a company or an area should be judged in terms of its particular problems. Government has recognized some part of this approach in respect to uranium, solely because of our great need for it, and because of our great need for it, and because the Canadian government has a ready purchaser for all that we can produce. So government has said to the developer: "not only will we buy all the uranium you can give us at an agreed basic price. We will go farther. If you can develop an orebody which can give us uranium in quantity, but of a grade which would not make the fixed basic price feasible, then we will negotiate a special contract with you and assure you a return of your investment and a profit".

So far so good. But we could not follow through on this line in the field of the competitive minerals. I do not believe any man in his senses would want government to buy all the country's base metal production at fixed, or contract, prices and stockpile its purchases against a day when prices will rise again. That is certainly not the tenor of my thinking. But uranium properties located close to present areas of settlement and on existing lines of communication are certainly not confronted by the problems which exist in, say, Beaverlodge - and government recognizes this fact quite clearly when it comes to contract-making, as it should.

What is suggested, then, is that every new mining area should be judged, in matters of taxation and exemption and in other ways, by the problems of the region itself. If the operator is to build railroads, or access roads, or other means of communication, then his aids, whether direct or indirect, should be greater than those granted to the operation which already enjoys these facilities. The same statement applies with equal force to the question of power. The man with a property adjacent to a power line is certainly not confronted by the problems of costly capital outlay which face the man who must operate hundreds of miles from a source of supply, and who may well have to find a site and develop it himself.

To emphasize my point, let me give just one example of what happens when public services become available to mining centres. The Chibougamau district in northern Quebec languished for many years without road, rail or power. It is, in fact, one of the oldest known mineralized areas in that province. From time to time some of the largest mining companies in the country spent large sums on exploration and early development, only to relinquish their holdings because of production costs. Then the Québec government provided a good highway from the head of Lake St. John and undertook to bring in power, and recently the government at Ottawa undertook to provide the region with a railroad to bring out base metal concentrates, and other resources of the district, and bring in its needed supplies. Now a district which lay dormant for decades has at last become a producing centre, simply because governments recognized that they must provide the facilities without which mining men will not risk large capital investment without some guarantee of a reasonable return.

My suggestion is not that these public services should be provided before a district is proven. The developer of mines of this country does not expect to be spoon fed, and he is not particularly fond of paternalism. He is prepared to risk, first to prove that he has something of value and then to develop it. But after taking the first and longest risk he often comes to the point in the development of a mineral deposit at which the tonnage and grade of the ore do not justify the huge investment in transportation and power facilities required for production in remote areas. When that happens - and every individual case must be judged on its own merits - then I think these aids are justified. Otherwise we cannot get ahead with the task of opening and developing the country.

That is my primary answer to the questions posed at the outset of this paper. The question of government participation in the provision of public services should be based on individual needs, rather than on across-the-board policies, under which in many cases the risk of private capital would not be justified.

During the earlier stages of development in remote areas, and based on personal experience in the Quebec-Ungava region, various aids would greatly assist the man who must run the basic risks.

It would be of great help, for example, if the required assessment work on claims and/or the requirements of Development Licenses were to be cut by, say, 50%, as recognition of the extremely short season during which men can work. In lieu of this, the annual rental per acre might well be reduced, to recognize the time factor.

As development proceeds and production becomes assured, it would seem to be the function of government agencies to provide suitable access roads, to provide wharves or docks at suitable locations on navigable streams leading to ocean shipping, and railroads from docks into central locations in new mining fields. Governments which are in the business of developing and selling electric power can assist, and justifiably, in this field as well. Here a specific case can be given in Gaspé Copper,

which will be supplied with power from the north shore of the St. Lawrence by cables laid under the river for a distance of 35 miles. The bringing of power to Gaspe Copper not only makes the operation itself feasible. It will revolutionize the economics of the whole Gaspe Peninsula, hitherto retarded by the lack of facilities for development in many fields.

Tax exemption periods might well be lengthened for development in remote areas, to enable repayment of borrowed capital. In special cases I would think of terms of 7 to 10 years. And I make the suggestion solely because to bring in capital we must provide the basic incentive, which is reasonable profit together with return of the capital investment. To this I would add the acceleration of depreciation allowances, applicable at the end of the exemption period, again as an incentive to capital investment. I would also consider some relief in the way of taxation for the small investor who is willing to provide risk capital for developing the mineral resources of the nation.

For emphasis' sake let me make again two points, which I believe to be the fundamentals of this whole discussion. First, we are thinking here of the task of getting our country developed, not of coddling the developer. Second, the provision of aids and facilities, whether provided in terms of road or rail transportation and power lines, or in increased exemptions, should be based in every case on the needs of the individual operation, for the selfsame reason - getting our country opened and increasing the national production.

One other point remains:

Many indirect levies are also made by the various governments, and as these are vitally related to the development of mineral resources, we might well look into this field as well, to see what justifiable encouragements might be written into our laws, as what may be called incentive legislation.

The task of developing the more remote areas of Canada falls on the shoulders of governments and operators, working together as partners, yet each independent of the other in his specific field. I make these points, of course, in my capacity as a developer and based on my own experience. I trust that this is the light in which you will consider them, realizing that, in a measure at least, they are rooted in self-interest. Nevertheless self-interest, as it derives from the willingness to run economic risks, is still at the core of our free society.

We Canadians are particularly fortunate in that we have good government. Our government is ever ready to lend a sympathetic ear to our mining problems. We are also blessed in that we can recruit among our citizens the men who can find and develop mines and the men who are willing to support the search financially and supply the capital to bring the properties into production. With the concurrence of this unbeatable team - good government and progressive people - I feel confident that the problem of mine-making in the far north will be satisfactorily solved for the enduring benefit of the nation.

APPENDIX - "K"

RESOURCES - RESEARCH - REWARDS

Benefits, in the form of an expanding economy, accrue for all when science and industry join in the development of our natural resources.

by

D. D. MORRIS, P. ENG.

Administrative Assistant

The Consolidated Mining and Smelting Co. of Canada, Ltd.

I appreciate very much the honour and privilege of speaking to you today and I am particularly pleased to be invited to say something on the question of the effects of research on the mining and metallurgical industry. I have chosen as a subject "Resources - Research - Rewards". Each of these terms may have rather broad interpretation and possibly a brief explanation of each is in order.

Resources - In general I refer to our mineral resources and, more particularly, to lead and zinc and their associated metals and by-products.

Research - I refer to technical advancements and developments in the mining and extraction metallurgy techniques which have taken place during the first half of this century.

Rewards - One naturally asks the questions, "Rewards to whom and rewards of what?" Considering the former, I feel that there are three very important recipients; namely: labour, the investor, and the public generally. How can we measure these rewards? In the case of labour, I feel that if we could establish the number of man hours of employment provided at any one time, this would be indicative of rewards to labour, and certainly it would be a measure of potential employment and wages. Rewards to the investor: it seemed reasonable that we should use as an index the amount of capital invested or necessary to carry out any specific operation. It is, of course, recognized that capital is not invested without expectation of a reasonable rate of return. With regard to the general public, they benefit from an improved general economy, whether it be provincial or national. Therefore, the quantity of materials produced seems like a good index, since the state of the general economy is a direct function of goods that can be sold on the world market.

Since our main interest at this Conference is the resources of this province, I think also that it would be of interest to have one more index and that is the quantity of power utilized in an operation.

With these yardsticks, I intend now to examine with you the improvement and rewards that have accrued, and are continuing to accrue to the mining and metallurgical industry in British Columbia as the result of scientific discovery.

FIVE STAGES

Although the process of development has been almost a continuous one through the years, I intend to divide this time into five stages and show results after each. Let us then take what I will call a representative mine and apply our yardsticks to the different stages of development to show the effect of certain discoveries on each one. The mine I have chosen is an imaginary one, but is fairly representative of lead and zinc mines having a non-free-milling type of core. We will also, for the sake of a comparison, assume that the mine is operated at the rate of 1,000 tons of ore per day. The ore in this mine has an analysis as follows:

Ag	Pb	Zn	Fe	S	Cd	Bi
Oz./Ton	%	%	%	%	%	%
1.6	5.0	7.0	19.0	16.83	.034	.0024

From the analysis we can see that a day's production of ore will contain the following minerals:

TABLE I
(Useful Mineral Products Contained in 1,000 Tons of Ore)

Silver.....	1,600 ounces
Lead.....	50 tons
Zinc.....	70 tons
Iron.....	190 tons
Sulphur	
Associated with Lead and Zinc	52
Associated with Iron	116
<hr/>	
Sulphur Total.....	168 tons
Cadmium.....	580 lbs.
Bismuth.....	48 lbs.

Now let us assume that the mine is being operated in the first decade of this century. (Stage I.) The recovery technique would consist of mining and crushing rock, then either handpicking high-grade lead ore or making a rough separation using mechanical means. The lead ores thus separated would be smelted in a blast furnace and refined to pure lead. If we look at Chart I we will now see just how much of our metals have been recovered and what the indexes for capital and labour are. !

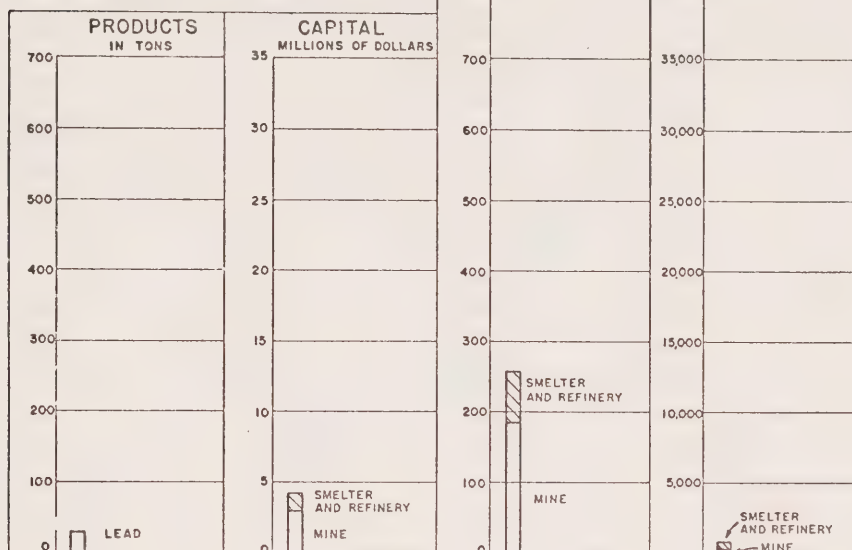
CHART I
(First Stage of Development)

You will see that we have recovered only 29 tons of lead out a total, in the ore, of 50. Although not shown, we have also produced 985 ounces of silver.

Capital invested is \$4,300,000. Labour--260 man shifts per day.
Power used--only 900 KW.

During the second decade two important developments took place in the lead and zinc metallurgical field. Each of these had a very far-reaching effect. The first was the development of differential flotation of minerals in ores and its application to the refractory lead and zinc ores. This process consists of grinding the ore to a very fine state then putting it in what is known as a flotation machine together with water and

CHART I.
FIRST STAGE DEVELOPMENT



certain oils and reagents, stirring and bubbling air through it. Using this technique and the right reagents the lead in the ore is carried up on the surface of bubbles and floats out of the top of the cell. Similarly by altering the reagents the zinc can be floated away from the remaining material, leaving a final or unfloated product. This material is commonly referred to as a tailings and consists of the gangue and iron sulphide concentrates.

The second development was the working out of the process for the extraction and recovery of zinc by leaching roasted zinc concentrates with sulphuric acid and recovering the zinc from the solution by electrolysis. The economic success of this process depends primarily on a source of low-cost power, and the zinc development thus stimulated an extensive hydro-electric development.

If we now imagine our mine is being operated in the period following these developments and the ores treated and the metals recovered by the techniques mentioned above, (Stage 2), we can see the improvement in rewards that have resulted by again applying the indices. (See Chart II.)

CHART II
(Second Stage of Development)

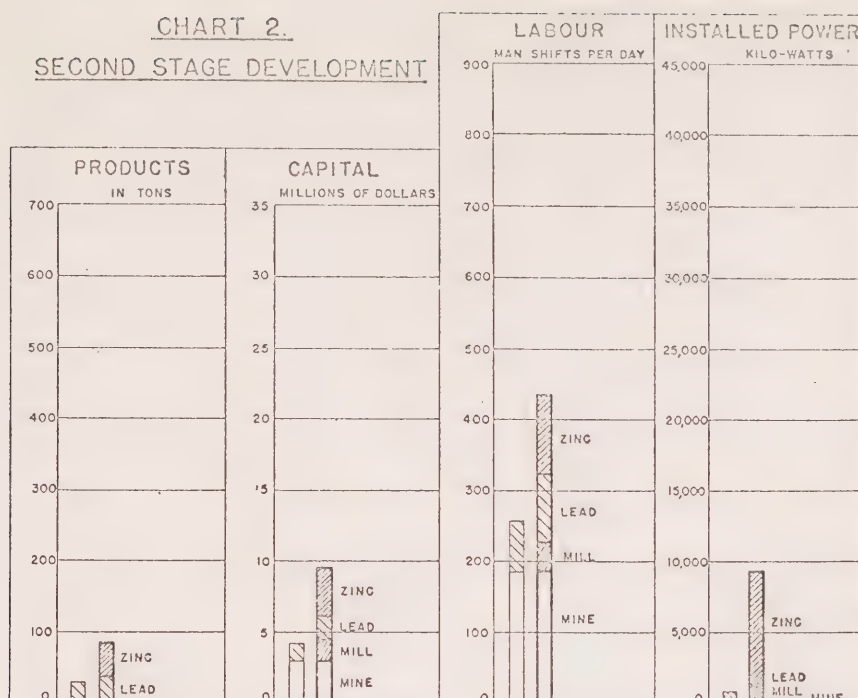
In Chart II, you will see that the lead produced has increased to 37 tons. In addition, we have produced 47 tons of zinc. Not shown is the production of 1,020 ounces of silver and 237 lbs. of cadmium.

Capital has increased by \$5,300,000, to a total of \$9,800,000.

Labour - by 175 man shifts per day, to 435.

Power - by the very large increment of 8460 KW, to 9360 KW.

CHART 2.
SECOND STAGE DEVELOPMENT



The next development which had an important effect on both the lead and zinc metallurgy was the development of a process known as slag fuming. To understand why this process is so important it will be necessary for me to describe briefly certain phases of zinc and lead metallurgy.

First, consider the flotation process. When the ore is separated into lead, zinc and iron concentrate efforts are made to produce an iron concentrate or tailing practically free of lead and zinc. To accomplish this it is necessary to have an appreciable amount of lead go into the zinc concentrate and also a certain amount of zinc into the lead concentrate. The amount of this mixing is a function of the complexity of the minerals in the original ore. When the lead concentrate is smelted it passes through the blast furnace to produce lead bullion (which is impure metallic lead) and slag. The zinc that accompanies the lead in the concentrate becomes part of the slag and is normally wasted.

In the recovery of zinc from zinc concentrate, the concentrate is first roasted to burn off the sulphur. Then the zinc is dissolved out with sulphuric acid. The undissolved portion, which is principally undissolved zinc and iron, together with lead and silver, is separated from the zinc solution by filtration. The residue or cake from the filtering contains as much as 24.0 per cent zinc, 15.0 per cent lead and 5.0 ozs. silver. This residue for many years was just placed in a stock pile.

From this you can see it was important to develop a process to recover these valuable metals contained in the zinc residue and the lead furnace slag. Such a process was developed and is known as slag fuming. If we treat the residue from the zinc operation in a blast furnace then the lead and silver is recovered in the lead bullion, the zinc going into slag together with the zinc that was present in the lead concentrate. In the slag fuming process the molten slag from the blast furnace is put into a slag fuming furnace and blasted with a mixture of air and powdered coal. The zinc is fumed off and after cooling is recovered in the form of a white zinc oxide dust. The zinc may be recovered from this dust in the usual way by leaching it with sulphuric acid. Now let us again look at Chart III and see the rewards that have accrued from this particular piece of research and development.

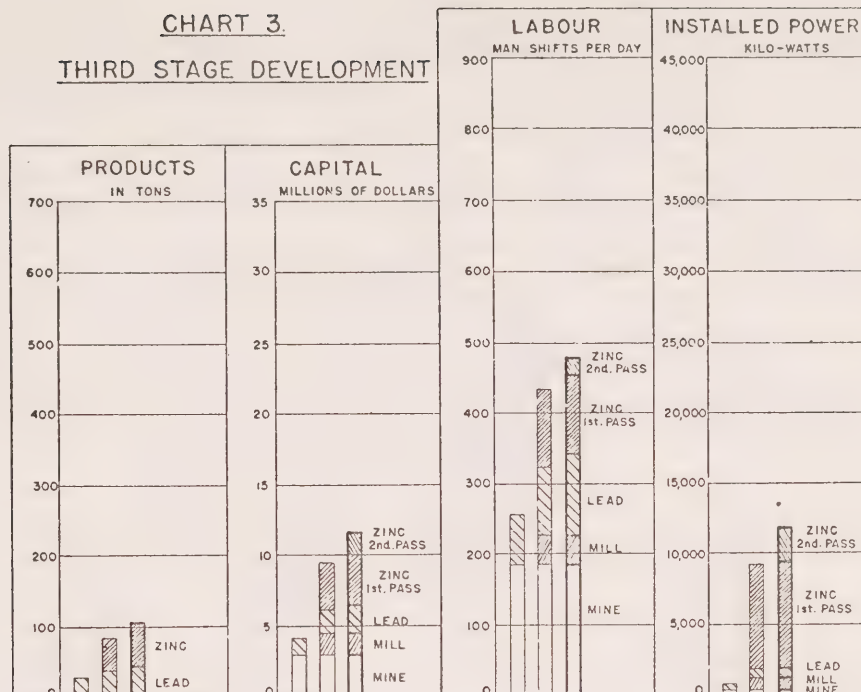


CHART III
(Third Stage of Development)

In Chart III, we see that lead production has increased by an additional 7 tons to a total of 44 tons per day, which is 88 per cent of the lead in the ore. Zinc has increased by 13 tons to 60 tons per day, or 85 per cent of the zinc in the ore. Not shown on the chart is the production of 1,270 ounces of silver, or 80 per cent of the silver in the ore; and 475 lbs. per day of cadmium, or 70 per cent of the cadmium in the ore.

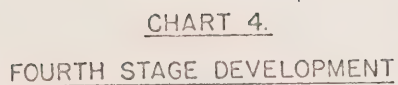
Capital has increased by \$2,600,000 to \$11,600,000.

Labour has increased by 44 shifts per day to 479.

Power has increased by 2,480 KW to 11,830 KW.

The first step in recovering zinc and lead from their concentrates is the removal of sulphur by burning it off to form the gas SO_2 . This is a colorless gas that can be wasted to atmosphere by discharging it from the top of tall stacks. In doing this, however, you are wasting a valuable resource and at the same time may be causing damage to the surrounding vegetation, particularly if the terrain is the mountainous type as in British Columbia. In order to recover and utilize usefully this potentially damaging and obnoxious SO_2 , a number of scientific discoveries had to be made and these had to be developed and put together in a definite pattern. I am not going to attempt to describe each of these. I will simply list them with a brief word of explanation concerning each.

1. Suspension roasting. This is a process for removal of the sulphur from
1. Suspension roasting. This is a process for removal of the sulphur from zinc concentrates which utilizes the full heat value of the burning sulphur for raising steam, and at the same time yields a flue gas having a high SO_2 concentration.



2. SO₂ recovery by ammonia absorption. A process for recovering and concentrating SO₂ from weak flue gases having concentrations as low as 0.75 per cent.
3. Ammonia Synthesis. This technique was first developed in Germany (1913), and first used on the North American continent in 1921. (Until after the first World War the Germans kept secret particulars of the catalyst and wartime efforts in the U. S. A. failed.
4. Hydrogen production by the decomposition of water using electric energy. This process is a very large user of power and in this process a special cell has been developed that also makes possible the recovery of heavy water, so vital to the atomic energy program.
5. Strong acid process for production of phosphoric acid and the manufacture of nodular ammonium phosphate.
6. Crystallization process for the production of large size ammonium sulphate crystals.

When all these processes have been put together in the proper manner and the sulphur that accompanies the lead and zinc from our imaginary mine is utilized, then it will affect our rewards, as shown in Chart IV.

CHART IV (Fourth Stage of Development)

In Chart IV, you will see that the metal productions are unchanged, but we have produced 123 tons of fertilizer per day, and in doing this, have utilized 78 per cent of the sulphur that is associated with the lead and zinc.

Capital has increased by the large amount of \$6,700,000 to \$18,300,000.

Labour--by 95 man shifts, to 574.

Power--by the large increment of 13,700 KW to a total of 25,530 KW.

One would now think that we have pretty well exhausted the possibilities for utilizing this particular ore. That is not the case, however. Utilizing the techniques described earlier and some important refinements of these, we can now go back and recover some of the values in the third component of the ore, namely, the iron concentrate. By roasting this material in our suspension roaster considerably more fertilizer can be produced, again affecting our rewards as shown in Chart V.

CHART V (Fifth Stage of Development)

In Chart V, you will see the fertilizer production has increased by 223 tons, thus utilizing 81 per cent of the sulphur in the ore.

Capital has increased by \$14,500,000 to \$32,800,000.

Labour has increased by 241 man shifts per day to 815.

Power has increased by 18,630 KW to 44,140 KW.

All these things have been and are being done, and the lead and zinc mined and processed in this province are subjected to complete recovery process. However, we are not finished yet. We can look forward to one or two more steps.

When the iron concentrate that I mentioned previously has been roasted, the product from this roasting is an iron calcine which is potentially an iron ore. To produce pig iron from this material is not a simple matter because it contains certain impurities that are not normally associated with iron ore and ferrous metallurgy. However, research is going forward on this problem, which I am sure will result in a successful process and when this completed we will have the rewards further improved by the amounts shown in Chart VI.

In many people's minds, the production of pig iron and steel are one and the same thing. This is not the case. Production of steel from pig iron requires an extremely high capital investment and to show you the amount of this I have extended our indices, in Chart VI, to show the production of pig iron from our imaginary mine, and the processing of it through to steel.

CHART VI (Sixth Stage of Development)

In Chart VI, you will see our total production has increased by 150 tons of pig iron. No increment for steel is shown, as, in actual conversion of pig to steel, there is a shrinkage of about 30 per cent.

Capital has increased by \$5,500,000 for pig iron and \$11,600,000 for steel, making the total \$49,900,000.

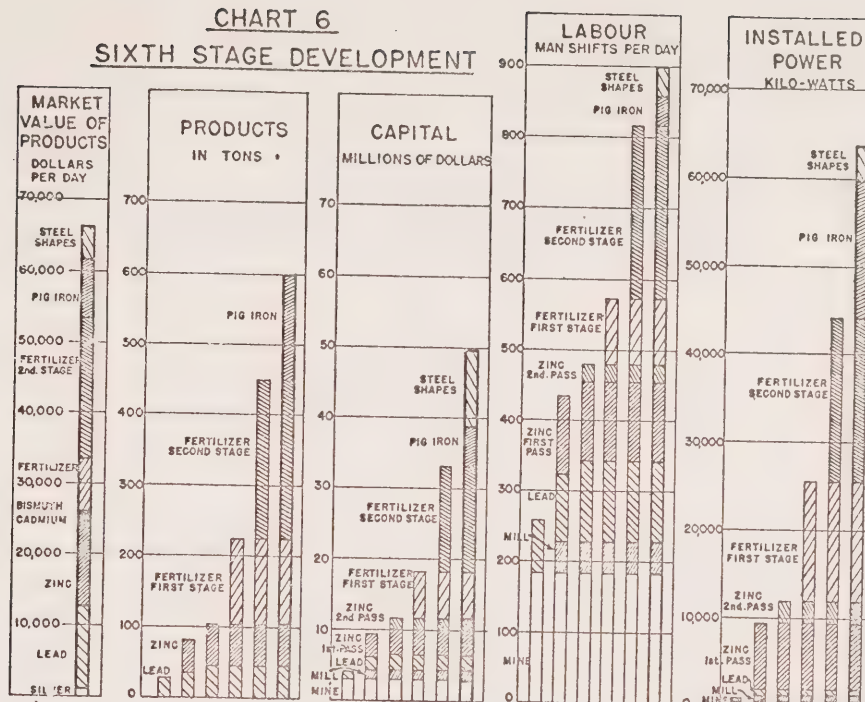
Labour has increased by 44 man shifts for pig iron and 85 for steel, making a total of 900.

Power has increased by 15,750 KW for pig iron, and 4,000 KW for steel, making a total of 63,890 KW.

In this last chart, I have added one more column: the one on the extreme left. This shows the market value of all the products derived from our imaginary mine.

A comparison of the various rewards at the present time (excluding pig iron and steel) with the initial one, will show the following improvement in rewards:

CHART 6
SIXTH STAGE DEVELOPMENT



Market value of the products in present-day dollars: \$8,700 to \$53,800 - or 6.2 times.

Capital: \$4,300,000 to \$32,800,000 - or 7.6 times.

Labour: 260 man shifts to 815 - or 3.1 times.

Power Utilization: 900 KW to 44,140 KW - or 49 times.

Gentlemen, I have in the foregoing developed these indices in rather a laborious and repetitious manner, but I think you will agree with me that I have shown that, given the raw ore, research in the mining and metallurgical field has resulted in extremely fine rewards to labour, the investor and the public generally. At the same time, it has stimulated the development and use of our native hydro-electric resources. I hope I have also shown the importance of the full and complete development of our province's wonderful natural resources. Rich as they are, we cannot afford to waste any part of them.

APPENDIX - "L"

"THE URANIUM INDUSTRY OF CANADA"

by

R. J. Henry,
Vice-President,
Eldorado Mining and Refining Limited

In introducing this paper to you, it is not necessary to enlarge on the theme of the importance of the mining industry to our Canadian economy. You, best of all Canadians, are well aware of the part your industry plays in the promotion of the general prosperity of the whole country. You know, also, how the search for minerals and later their production opens up those large tracts of our hinterland which are not suitable for agriculture and, in some cases, not even for forestry. Consequently, the mining and processing of any new mineral on any considerable scale is a matter of national importance and of particular interest to this Conference. The uranium mining industry is rapidly approaching such a state of importance, and this paper has been prepared with a view to describing some of the problems special to it at the moment and others which may be expected to develop in the future.

The history of events leading up to the present interest in uranium will be covered here briefly. When Great Britain and the United States decided in 1942 to attempt to build an atomic bomb, Canada had the only uranium mine and refinery of any importance in operating condition in the Western Hemisphere, and Canadian statesmen were aware of this decision and were a party to it. This mine, located on the shores of Great Bear Lake and equipped with a 100-ton gravity mill, was owned by Eldorado Mining and Refining Limited, and had been discovered, developed and operated from 1933 to 1940 by Mr. Gilbert LaBine, chiefly for radium and silver, rather than for the rich uranium content of the ore for which there was little market at that time. At the request of the Government of Canada, Eldorado quietly re-opened the mine, and the refinery located at Port Hope, Ontario, and began production of uranium for the Manhattan Project. It was thought to be wise at that time to retain all sources, knowledge and productive facilities for uranium in government hands and in September, 1943, Orders-in-Council were passed reserving to the Crown all new discoveries of radioactive minerals in the Yukon and Northwest Territories and banning their staking and mining by private individuals. Some of the Provinces took similar action. In January, 1944, the Government expropriated the private Eldorado company with compensation to the shareholders, as a security measure, and formed the Crown company, Eldorado Mining and Refining (1944) Limited. The new company operated the mine and refinery without any change of management and with the able assistance of the Geological Survey of Canada began active prospecting for uranium deposits.

At the end of the war an Atomic Energy Division of the United Nations was set up and the United States suggested full control of all atomic weapons and resources should be vested in the United Nations, provided all countries agreed and that proper inspection was enforced. This was known as the "Baruch Plan". Because the Soviets would not join this plan it never became operative, but some one and a half years' delay

ensued and during this time it was thought wise to retain full control of uranium resources in government hands. When it was clear that the plan had finally failed, the Government decided to enlist the assistance of private industry in the search for new orebodies, and late in 1947 rescinded the Orders-in-Council prohibiting public participation in uranium mining, an action copied by the Provinces. On March 16th, 1948, the Rt. Hon. C.D. Howe announced that Canada would buy uranium concentrates, published a price schedule and guaranteed purchase for five years. Response at first seemed slow and the price schedule was found not to fit the grades of ore and types of mine the prospectors were able to find. The price was revised and the guaranteed period extended until the present price schedule, popularly known as \$7.25 per pound and in effect until March 31st, 1962, was established.

Before the public was invited to participate, Eldorado had made important discoveries in the Beaverlodge area to the north of Lake Athabaska in Saskatchewan and had rehabilitated the mine at Great Bear Lake where ore reserves had been depleted by wartime production. While prospecting was active by private interests from 1948 on, an event of some importance was necessary to create real interest. Eldorado decided to increase production at Port Radium by the addition of a 300-ton acid leach plant. This was the first chemical plant for treating low grade uranium ore in Canada, and preliminary testing and engineering of the flowsheet was carried out by the Mines Branch of the Department of Mines and Technical Surveys. This plant went into production in June, 1952. Further, after underground development at the Ace mine at Beaverlodge, it was decided in the fall of 1951 to build a basic leach plant there with an initial production of 500 tons per day, and this mill went into production June 1st, 1953. This activity stimulated the search for orebodies and suggested the possibilities for the treatment of disseminated pitchblende ores.

In Northwestern Saskatchewan, as soon as the value of the Ace orebody was disclosed by Eldorado the Province leased considerable areas to numerous development companies. In 1952 the parts of these leases which remained unstaked were thrown open to the public, resulting in a great staking stampede. That fall Albert Zeemal, prospecting for Mr. Gilbert LaBine, made a discovery on newly staked ground of an old concession which was soon to be known as the Gunnar mine. During the winter of 1953, as the outline of the ore was disclosed by drilling, it was apparent that here was indicated an outstanding deposit of uranium ore. This discovery had a profound effect on uranium prospecting and mine development.

In the fall of 1953 Gunnar Mines Limited negotiated a contract with the Government of Canada, through its agent Eldorado Mining and Refining Limited, to purchase a large quantity of high grade uranium concentrates at a special price somewhat above the published price schedule. It is expected the fulfilment of this contract will occupy the full capacity of Gunnar's 1250-ton plant for at least five years. This was the first contract of this kind and the fact that such contracts could actually be arranged further stimulated interest in uranium mine development.

The Gunnar discovery was followed closely in 1953 by the gradual disclosure of a potentially important field in the Blind River area of Northern Ontario, an accomplishment ably conducted by Mr. Franc Joubin and his associates. While low grade, this field may eventually hold several very large tonnage producers and conceivably could in time surpass production from Athabaska. The Pronto mine in this area was discovered first and its location on the railway and highway has speeded its development. Pronto has negotiated a similar contract to Gunnar and is presently designing a plant to treat 1000 tons per day.

Active development is going on in the Bancroft area of Southern Ontario where large tonnages of low grade ore have been indicated on several properties by diamond drilling. Every issue of the mining papers reports further discoveries in various parts of Canada. Interest is at its height and a typical mining boom is in progress. We are on the threshold of important production. While regulations prohibit the publication of figures which would give you the production expected by 1957, there is no doubt that by that time the uranium mining and processing industry will have increased eight-fold over the wartime rate and can be included with that group of minerals which are produced in Canada on a large scale.

This great expansion of production will be due largely to the part played by private mining industry. In Canada not only is our mining industry of important size, but it is highly adaptable, full of ingenuity and, once given a price incentive, anyone would be foolish to put a limit on what can be discovered and brought into production. The industry's methods of prospecting, developing and financing are well known and need no description here. However, the Government has also played an important part in this expansion, a part perhaps not so well understood, which should be recorded here.

Two Departments, that of Defence Production under the R. Hon. C. D. Howe and that of Mines and Technical Surveys under the Hon. George Prudham, have been active in building up the Canadian production of uranium.

The Crown company of Eldorado Mining and Refining Limited is the agent of the Department of Defence Production. This company is governed by a Board of Directors, all of whom are prominent in either the mining or the legal profession, and none of whom (with the exception of Mr. W. J. Bennett, President and Managing Director) are government employees, thus enabling the company to operate in a similar fashion to a private company. Mr. Bennett is also President of Atomic Energy of Canada Limited, thus providing close relations with this other Crown company whose purpose is to develop the industrial uses of atomic energy. These two companies will be even more closely integrated in the near future. Eldorado is the Government purchasing agent for all uranium ores and concentrates and since its formation has attempted by various means to encourage and increase uranium production in Canada. At present Eldorado operates two mines, one on Great Bear Lake and one in Northwestern Saskatchewan, both equipped with modern treatment plants, and a refinery at Port Hope for uranium concentrates. It also operates the Northern Transportation Company Limited, which is a public carrier for all types of freight up and down the Mackenzie River watershed. It has an Exploration Division which has been active in prospecting and searching for new ore deposits. In 1953 it organized a Research and Development Division with Mr. Arvid Thunäes as Director, and this Division is actively engaged in improving the known methods of ore dressing, chemical leaching and refining of uranium ores and searching for new methods. The Port Hope refinery is being remodelled to permit the production of uranium compounds suitable for direct reduction to metal. The technique of the manufacture of uranium metal of a degree of purity suitable for use in nuclear reactors is under study, and it is the policy of the company to process uranium ores eventually to the metal stage in Canada. Information on new and improved methods of ore dressing and metallurgy are available to private industry on request. Not the least of the duties of this Division is the training of young engineers in an applied science which has not yet been written in the text books and some of which is still classified as secret information.

The Department of Mines and Technical Surveys has been and continues to be of vital importance to the uranium industry. The technique of acid leaching in Canada was developed in the laboratories of the Mines Branch and operated there on pilot

plant scale. While basic leaching was developed by Professor Forward of the University of British Columbia, working with Eldorado engineers from Port Hope, the basic idea was suggested by the Mines Branch. Scientists and engineers there under Dr. E. A. Brown, Chief of the Radioactivity Division, are working constantly to develop new methods not only in the metallurgical field but also in methods of analysis and detection. Here ores from mines and prospectors all over Canada are tested for the best methods to recover the uranium content. This year this last work has grown so extensively that practically no time or space can be devoted to basic research. Here again, as well as in the Eldorado organization, young engineers and scientists are being trained in a new science. The Mines Branch also does important work for Atomic Energy of Canada at Chalk River.

The Geological Survey of Canada has been actively in search for uranium since 1944 and maintains a Radioactivity Division under Dr. A. H. Lang. In addition to mapping and field work all discoveries are recorded and as many examined as the staff can cover. The survey provides free of charge six quantitative assays from each discovery or new group staked, and valuable mineralogical reports. A great deal of valuable information for the prospector and geologist is published.

The duties and responsibilities of these Departments are provided for under the Atomic Energy Control Act, 1946, and the regulations of the Atomic Energy Control Board established by this Act. Under these regulations all discoveries of radioactive minerals with their location and the results of any assays are required to be filed with the Geological Survey of Canada. To explore a discovery by surface work and other means, an Exploration Permit must be obtained from the Atomic Energy Control Board. Ores or concentrates containing more than 0.05% uranium or thorium may not be sold or otherwise disposed of without permission from the Board and before a Mining Permit is obtained. Only the Eldorado Mining and Refining Limited may purchase uranium ores or concentrates, and this company has a published price schedule and will negotiate special prices under certain circumstances. It is permissible to publish the estimated grade and tonnage of indicated ore for prospects under development, but as soon as a company is able to announce plans for production, only the gross value in dollars of the contract can be given to the public. The disclosure of the price would indicate indirectly the amount of uranium covered by the contract, and this, therefore, may not be disclosed.

The published price schedule has been mentioned above several times and this, together with the "special prices", requires description in some detail. When the price schedule was first announced in 1948 the Eldorado mine at Great Bear Lake was the only successful one which had been discovered. Here the uranium mineral is pitchblende occurring in coarse concentration and reasonably amenable to recovery by gravity concentration. Other prospects known at that time in the Northwest Territories, Athabaska, Lake Superior region and in Haliburton, while of varied type and mineralization, were mostly considered to be suitable for gravity concentration. In fact, at this time no other method of ore dressing was seriously considered. Consequently the first published price schedule read in part as follows:

"The government will purchase through Eldorado Mining and Refining (1944) Limited, or other designated agency, acceptable uranium-bearing ores and concentrates on the following basis:

1. A minimum content equivalent to 10 per cent by weight of uranium oxide (U_3O_8) in the ores or concentrates will normally be required."

The final revised form of this schedule and at present guaranteed to March 31, 1962, is still operative, although practically no ores have been purchased under it. The price for the U_3O_8 is obtained by multiplying the pounds of U_3O_8 contained per ton of mill feed by the base price of \$2.75 per pound and adding to this product a milling allowance of \$7.25 per ton. This sum is then divided by 70% of the number of pounds of U_3O_8 in the mill feed with the stipulation that the maximum price shall not exceed \$6.00 per pound, which is the price for concentrates derived from ore of 0.25% grade. To this is added a development allowance of \$1.25 per pound guaranteed during the first three years of production. This is the origin of the "\$7.25 per pound" price so often quoted in the papers. You will note it is a maximum of \$7.25 per pound on low grade ores and a lower price per pound on ores over 0.25% U_3O_8 , and you will note concentrates of 10% U_3O_8 are "normally to be required". You will also note the concentrates must be acceptable. This means that if they contain other elements which cannot be economically separated from the uranium they would be unacceptable.

While this formula may not be used to any extent, it still provides a measuring stick for the prospector and in early development for the engineer, and has proven useful for this purpose.

However, with the discovery of the Ace mine by Eldorado at Beaverlodge it became obvious that here was an ore from which you could not make a 10% concentrate, nor could a satisfactory recovery be made at that time without the assistance of chemical leaching. Also, the tailings from the mine at Great Bear Lake still contained enough uranium in fine particles to pay for recovery by leaching. Consequently, the Eldorado, assisted by the Mines Branch, developed an acid leach plant to treat tailings at Great Bear Lake and a basic leach plant for the whole ore at Beaverlodge, where it was feared the already considerable carbonate content of the ore would increase with depth and create abnormal acid consumption. Both of these processes produced a high grade concentrate which was cheaper to ship to Port Hope and cheaper to refine on arrival, but which involved both high capital outlay for plant at the mine and a high cost for reagents. That is, while the costs were much higher, the "cost plus tails" was lower.

Provision for a special price had been provided from the first announcement by the Rt. Hon. Mr. Howe as follows:-

"Under special circumstances, consideration may be given to payment of a higher price or to acceptance of ores or concentrates of lower grade".

This was elaborated by Mr. W. J. Bennett on several occasions, but his remarks before the Canadian Club in Toronto on November 2, 1953, were particularly explanatory and should be reported here, Mr. Bennett said, in part:-

"Under normal marketing conditions, there is a world price for metals which is determined largely by demand. But we are not dealing with a normal situation. The fact that the bulk of the uranium production in the free world is now being used in the atomic bomb programme means simply that there is a single buyer -- the United States Atomic Energy Commission. So long as this condition prevails the establishment of price will rest finally with the Commission. While as a producer I can understand the demand for a higher price, I believe I also have some appreciation of the problem which the Commission faces in its attempt to work out satisfactory prices for producers in the United States and producers in other countries. Here, I should point out that Canada is only one of several countries now supplying uranium for the bomb

programme. If we admit, as I think we must, that our partnership with the U. S. in that programme is in the national interest, it follows that in establishing a purchasing policy, we must endeavour to equate our responsibility as a partner with the reasonable needs of the Canadian producer. We have tried to do this by adopting a policy midway between the practice which prevails under normal commercial conditions - where price is dictated by demand, and the practice which prevails under conditions of wartime buying - where price is usually arrived at by negotiation and is related to cost. There is a fixed price which is available to all producers, but we have also said that we will consider the payment of special prices where conditions warrant such consideration. Such special prices will be arrived at by negotiation and will be related to cost.

"What conditions might warrant the payment of a special price? One example would be the case of a property with a proven tonnage of substantial size but which, because of grade or location, could not produce under the published price schedule. Another would be the case of a property which was able to produce a high grade product but only after large expenditures for the concentration plant and its operation Similar arrangements are in effect in the U. S., Australia and S. Africa."

The massive Gunnar orebody found on St. Mary's Channel on the shores of Lake Athabaska was of the disseminated pitchblende type similar to the Eldorado ore at Beaverlodge Lake, and equally unsuited for gravity concentration. Moreover, it was located in a high cost area and its principals were prepared to invest a large sum of money and produce a high grade product. The Gunnar mine, therefore, fitted the condition for a special price and one was negotiated and a contract signed for the delivery of some \$76,000,000 of concentrates. This was the first special price negotiated.

The next case was Pronto in the Blind River area of Ontario. The ore is low grade but a substantial tonnage is indicated. The uranium mineral is largely brannerite, a combined uranium and titanium oxide, and some thorium is present. This is a different type of mineralization from any other in Canada being mined at present, and requires an acid leach with some modification from that used by Eldorado or planned by Gunnar. Mining costs will necessarily be high because of the thin, flat-lying bedded shape of the orebody. Here too a special price has been negotiated for a large quantity of high grade concentrates.

These are the special price contracts but there will be more. Several other large deposits are reported in the Blind River area but negotiations with their principals are not yet begun. In the Bancroft area several mines are developing considerable tonnages of low grade ore. If the expected grade at these properties can be achieved in mining operations, the low cost of operating in this area and a relatively simple metallurgy should permit uranium to be recovered at a profit.

How are these contracts negotiated? Some description of the steps may be of interest to you.

Mine owners who have indicated to their own satisfaction that they have sufficient ore to warrant the construction of a hydro-metallurgical plant for the recovery of uranium are invited to explore with Eldorado engineers the possibility of a special price arrangement.

Such mine owners are expected to submit to Eldorado at this time:

1. Reports and drawings substantiating their ore reserve position and the grade of ore they expect to treat
2. Mineralogical and metallurgical reports indicating impurities which may be present and outlining a satisfactory method of treatment and the recovery which is estimated.
3. Statement of accounts showing cost of development to date.
4. Engineering estimates of additional capital expense to bring the property into production.
5. Engineering estimates of operating costs.

Provided that the mine owner has reasonably demonstrated the existence of an adequate orebody and that a high grade concentrate with permissible percentage of impurities can be produced, Eldorado is prepared by the application of a formula to offer the mine owner a price per pound for a definite amount of U_3O_8 in concentrates. This price will take into consideration the capital cost of bringing the property into production and the cost of operations, but cannot exceed a ceiling established. The formula for the calculation of the price and the ceiling are not disclosed and, while the price offered is classified, the mine owner is permitted to disclose the amount of this price to his directors and bankers or other financial institutions who may be expected to complete his financing. The price may not be disclosed, however, to the shareholders or the public.

If the price and other conditions are acceptable, Eldorado then writes a contract for a certain number of pounds of U_3O_8 in concentrates to be delivered within a definite period of time - usually not less than five years - and, in any case, to be completed before March 31, 1962. The contract contains specifications for the product and spells out the method of payment, sampling and assaying procedure, as well as many other details.

Provided the estimate of capital and operating costs are reasonably accurate and the grade of ore and metallurgical recovery are up to expectation, the mine owner can expect to get back the whole capital and pre-production cost and win a profit. This kind of a guarantee cannot be obtained other than in gold mining and perhaps some other of the strategic metals.

The effect of the formula is to pay a higher price per pound for U_3O_8 in concentrates won from low grade ores and also a higher price when operations are in high cost areas. The effect, however, is not such that is unlikely to upset the age old law that to the producer of quantities of higher grade ore goes the big prize. Neither does it change the fact that you can't treat low grade ores at a profit if the type of deposition and method of treatment are such as to create high costs.

The arrangement described above has been criticized and admittedly in its early application it has created some doubt concerning what is a mineable grade of ore. In the short time of less than a year, during which two big contracts have been negotiated, it has become pretty well understood that the special prices do not vary over a very great range and the premium above the published schedule can be expected to cover not much more than the extra cost of obtaining a high grade product plus a reasonable profit on the extra work involved. Prospectors and development engineers

are using the old published schedule for a yardstick in the preliminary stages of exploration, and this seems a sound practice. No doubt you will all agree that in the early stages of mine development the exact price is not too important, because the factors of grade and tonnage are only known between very wide limits. No one would want to build a mill for a zinc mine of 2% grade, but if that grade were indicated in a drill hole or surface trench under suitable geological conditions, most development engineers would want to explore the area to discover if an orebody was in the vicinity. The same applies to uranium prospecting. When something resembling an orebody is partly delimited, the owner can always interview the Eldorado engineers to discover how attractive their find may be. In any case, the range in price is known well enough to determine more accurately the possibilities of a deposit than has been the case with zinc or lead in recent years, particularly when one considers you can obtain a five year contract which would be very unusual for any base metal.

Those of you who may not have become intimately connected with this relatively new uranium business may wonder what grade of rock can be classed as ore. Like any other mineral, this varies tremendously with the locality and the unit of the operation. You only have to compare two such gold mines as Kerr-Addison and Discovery Yellowknife to see this feature is not peculiar to uranium mining. Thus, under the very special circumstances of a large massive deposit located near rail transportation and a source of cheap power, where cost of treatment is low and where local municipalities provide community services and a supply of labour, it is probably possible to mine and treat ore containing only 0.075% U_3O_8 . Where the deposits were narrow and irregular, requiring a fairly high development and mining cost, the grade would have to be increased to about 0.10%. Again, if such a mine were located far from the railhead or if the leaching of the ore involved a high reagent cost, the grade would have to be increased materially to make the operation profitable.

Eldorado will also accept raw ore on a custom basis where treatment facilities are available and this is purchased at a price per contained pound of U_3O_8 in the ore delivered as determined by sampling. This price is arrived at by a modification of the same formula but does not pretend to take care of the whole of the pre-production and plant costs at the mine, since the custom ore shipped may be on a temporary or salvage basis.

A few words can describe what has been done with the uranium so far. Eldorado upgrades certain concentrates at Port Hope and sells a refined product, together with certain other concentrates which are already high grade, to the United States Atomic Energy Commission.

If you accept the assurance of this paper, you will believe that within three years the uranium industry in Canada will have reached real importance, both as a contributor to the total value of all minerals produced in Canada and to the free world supply of uranium. This activity will have a considerable effect on the economy of the country. You may well ask if this production is to be on a continuing basis or is it of a temporary and passing nature. In other words, what is the future of uranium?

At present Eldorado has authority to purchase all uranium offered under the published price schedule until March 31, 1962, and is arranging special price contracts for delivery of definite amounts of uranium concentrates prior to that date, but in no case beyond it. Whether this date will be extended or not, no one knows at the moment.

At some time in the future the demand for uranium for the arms programme must become satisfied, unless the world becomes involved again in a total war. Also, at some time in the future it is expected with confidence that there will develop a long

term demand for uranium as fuel for atomic power reactors. What this demand will be and how soon it will come is a matter of speculation at present. Dr. W. B. Lewis, Vice-President in charge of Research and Development at Chalk River, and our Canadian authority on these matters, has stated:- "Within fifteen years there is a reasonable expectation that nuclear energy will prove cheaper than imported coal for power generation". It must be pointed out that Dr. Lewis was speaking of Canada and that he uses \$8.00 per ton as the cost of coal. It must be remembered that Canada is singularly well equipped with potential hydro electric power sites and many nations are not so favoured. In other words, the use of nuclear energy may make more rapid progress in other countries because water power is not available and coal should be reserved as raw material for the chemical industry. This is true of Great Britain. Thus, there is a reasonable certainty that Canada will always be an exporter of uranium, provided the cost of production will permit.

We must also remember that uranium as fuel for a reactor contributes to the cost of power derived from that reactor. Therefore, the lower the cost of the uranium fuel the greater will be the use of these reactors and the date of their operation in numbers, which will consume important quantities of uranium, will arrive sooner.

Canada is not the only producer of uranium, as you are well aware. Production in the United States reached record levels this year. At least fifteen orebodies are known to contain reserves in excess of 100,000 tons each and several of these greatly exceed this figure and the ore is highgrade. By the year-end, nine mills will be producing on the Colorado Plateau and mills in other areas are under construction or planned. Uranium is also being recovered as a by-product from four phosphate plants in Florida, and negotiations with several others for additional facilities are in progress. In South Africa six plants are in operation, and several others are scheduled for completion this year. South Africa's potential for low cost uranium is very great. In Australia two plants will be in operation this year. By this you can see we are going to have plenty of competition on a world market.

It would seem obvious that we should be prepared to meet a period when the arms programme may have ceased and the demand for industrial use may not have risen to the point of absorbing all production. During this period the law of demand and supply will govern, and the producer will have to meet the price set by the world market. If a free market for uranium exists, it is possible even our Canadian utilities using atomic power will buy on this world market, since they are likely to be independent of any direction by the Federal Government. At this time our producers will only be in a position to continue in operation if they can produce as cheaply as any other producer outside of Canada, or at least cheaper than most. The producers who have had a special price contract should have their plant and pre-production expense completely written off at this time and be in excellent shape to meet world competition, but let us not forget that indications so far would incline us to think that most of the Canadian production will be derived from low grade ores. What can we do during the next few years to assist these producers to prepare to meet a competitive world market?

Atomic Energy of Canada will do all within its power to develop the industrial uses of radioactive elements.

Eldorado's Research and Development Division and the Mines Branch are searching actively for better and cheaper methods of ore treatment and meeting with considerable encouragement. There is hope that methods of preconcentration can be developed which will enable ore to be treated at a more reasonable cost. Testing laboratories such as that maintained by the Sherritt Gordon Mine have done very valuable work and are continuing to do so.

The universities can help with many problems of basic research. The Atomic Energy Control Board assists any interested universities with grants to promote research of this type.

The producers can help themselves by maintaining adequate cash reserves and sparing no effort to achieve low costs against a rainy day, when a low price might make low costs vital for survival.

And last but not least, the Provinces can play a vital part. Most of the uranium produced will be in the Provinces and derived from ores in lands administered by the provincial governments and subject to provincial regulations, taxes and royalties. Let us not be carried away by the excitement of the stock market and decide to reap a quick profit on an industry which is as yet unproved and whose long-term future is uncertain. Royalty rates set now in a period of boom and over-estimated prosperity could be hard to modify or reduce in a time of depression which might come to our whole economy, as well as to uranium mines. Let us not forget the lesson of the gold mines in the last depression. Let us hope this new uranium industry, which is filling the gaps in the ranks of the mining industry caused by gold mining failures, may prosper and survive.

It is true we are at the moment in the middle of a uranium boom, which by the nature of booms will not go on forever, and must be tempered by periods of adjustment and reaction. It is possible our uranium production may afterwards appear to have come on too fast and too early, but this is considered unlikely. We do not expect to find and mine all the uranium in Canada in the next few years. Self-appointed prophets of gloom in the mining industry grow scarcer every day. In the meantime the potential of Canada to produce this element has been explored, a small army of prospectors, geologists, mining and metallurgical engineers, millmen, assayers and chemists have learned and practiced a new art and quite a few people have made money. In any case, any curb on Canadian production is unlikely to change the world picture because search and development of uranium mines in the United States and other countries of the Commonwealth has been just as active as in Canada and has produced similar results.

Let us then go forward cautiously but with confidence, determined to keep this branch of the mining business on a sound basis and to stay in the front rank of the nations who can use this new tool.

APPENDIX "M "

"THE OIL AND GAS PICTURE IN CANADA TODAY"

by

E. D. Loughney,
Chairman,
Board of Directors,
Alberta Division,
Canadian Petroleum Association

In 1953, for the first time, petroleum products were of greater value than any single mineral produced in Canada. The Dominion Bureau of Statistics placed the value of petroleum and natural gas produced in 1953 in excess of 209 million dollars. This is approximately 40 million dollars more than the most valuable single mineral which is nickel. In order not to overlook in any way the importance of Canada's mineral products, I would point out that the total value of Canada's minerals in 1953, including metallic, non-metallic minerals and coal, was in excess of 938 million dollars, or almost a billion dollars.

It was only eight years ago that the Canadian oil industry was a mere infant compared to mining enterprise in this country. Let us look briefly at the sudden growth of this industry and compare its size and dimensions then and now.

In 1946 the requirements for crude oil in Canada were 222 thousand barrels daily. Producers at that time were able to supply only 9.4 per cent of this demand. In 1953 consumption in Canada had more than doubled and Canadian producers were supplying 43 per cent of total demand. It is estimated that consumption of crude in Canada will climb to 550 thousand barrels daily in 1954. The producing potential in Canada is now 375 thousand barrels per day, or almost 70% of the country's requirements. The refining capacity in Canada at the end of December 1953 was 537 thousand barrels per day. By September 1, 1954 it had increased to 562 thousand barrels per day.

Canada, in 1953, ranked in seventh place among the world's oil producers. In 1953 it was the third largest producer in the Western Hemisphere, edging out Mexico who formerly ranked third. It is a trailing third I must admit when one compares Canada's 1953 production of 81 million barrels to the U. S. production of approximately two and one-third billion barrels and Venezuelan production of 644 million barrels.

The strategic importance of finding additional crude oil reserves in the Western Hemisphere becomes apparent when one studies the location of the world's crude oil reserves. The Middle East, including Saudi Arabia, Kuwait, Iraq and Iran, now accounts for roughly 58.5 per cent of the world's reserves. In time of national emergency this reserve could be seriously threatened. The Western Hemisphere, consuming a major share of world petroleum products holds only 31.8 per cent of total world reserves.

Since 1947 the Canadian petroleum industry has spent one and one-half billion dollars in the exploration and development of crude oil and natural gas reserves. At the end of 1953, crude oil reserves stood at 2.044 billion barrels and natural gas reserves were approximately 15 trillion cubic feet.

Before discussing two questions of particular interest to the Canadian industry today, I would like to review briefly its record in 1954.

This year has seen an average of one million dollars spent daily in the search for additional reserves of oil and gas. What has been found? Well, I first must mention Pembina. Although the initial discovery of commercial quantities of crude in the Cardium Sand was in 1953, the importance of this field was not fully realized until early in 1954. Estimates of reserves today vary considerably but it is not unlikely that Pembina will become Canada's largest oil field.

A number of important field extensions have been recorded in Alberta during the year. At Sturgeon Lake, the Devonian reef trend has been extended Southward so that the field now covers an area 20 miles in length with reserves estimated in excess of 100 million barrels. At Joffre, a possible field extension to the Northwest has recently been recorded.

There were several other discoveries of importance in Alberta in 1954 but perhaps of greater significance was the great progress of both Saskatchewan and Manitoba during the current year. In Saskatchewan production almost doubled during the first six months of 1954 compared with the same period of 1953. In Manitoba production during 1954 has quadrupled over that recorded in 1953. Perhaps the most significant event in Saskatchewan during 1954 was the discovery of light gravity crude in the Mississippian near Frobisher, Saskatchewan. Since the discovery in March four successful step-outs have been drilled. Mississippian prospects in the Midale area were greatly expanded during the year with a total of 21 wells now on production, and five wildcat or development wells currently active.

The rapid rise in Manitoba's production has come in large measure from the discovery of several new Mississippian pools in Southwestern Manitoba in the general Virden-Roselea area.

In summary, 1954 has been a year of active development for the Canadian petroleum industry. The pace of exploration continues without letup. The outlook for continued progress is certainly excellent.

Now I would like to single out for your further consideration two matters of particular interest at this time to the petroleum industry in Western Canada.

First, there is the question of securing additional markets for the increasing crude oil reserves of the Prairie Provinces. Secondly, there is the matter of Gas Export from Alberta to Eastern Canada.

As you are aware, both production and producing potential of the Petroleum Industry have been increasing rapidly. The following figures compare Canadian crude oil production with estimated annual producing potential for the years 1950-1953. You will observe that the percentage rate of increase in producing potential has not been as great as the annual percentage increase in crude oil production. This is certainly a desirable trend and reflects the Industry's great strides in extending into more distant crude oil markets via Interprovincial and Trans-Mountain Pipelines.

THOUSANDS OF BARRELS PER YEAR

	<u>Actual Production</u>	<u>% Increase Over Previous Year</u>	<u>Producing Potential</u>	<u>% Increase Over Previous Year</u>
1953	80,902	32	118,625	12
1952	61,212	28	100,375	22
1951	47,616	64	82,125	32
1950	29,088		62,050	

In this matter of additional markets, I'm sure all of you will agree that a desirable minimum objective for the Petroleum Industry to strive for is to supply as large a share of Canadian requirements as economically possible while at the same time endeavouring to utilize to the fullest the Industry's producing potential.

At the outset, it might be well to review briefly markets presently served with Canadian crude.

Following the major discoveries of 1947 and 1948 at Leduc and Redwater, crude oil production was limited to prairie refinery capacity until the completion of the Inter-provincial Pipe Line in 1950. At that time Alberta crude oil markets were extended Eastward to Superior, Wisc. and by lake tanker to Sarnia, Ontario.

In 1953, Interprovincial completed a major 30" diameter extension to Sarnia which has extended the Eastern competitive limits of Canadian crude well into Ontario. With the completion of its 1954 construction program, Interprovincial's year-round capacity may be expected to be as follows:

<u>Eastward</u>	<u>1953 Actual</u>	<u>End of 1954 Capacity</u>	<u>% Increase</u>
From Edmonton, Alberta	141	205	45
From Regina, Saskatchewan	97	170	75
From Gretna, Manitoba	85	159	71
From Superior, Wisc.	78	138	61

(The figures are in thousands of barrels per day.)

Trans Mountain Oil Pipe Line was completed to Vancouver late in 1953, with a daily capacity of 120,000 barrels per day. Initial throughput has been at the rate of 30-35,000 barrels per day. This is expected to increase 15,000 barrels per day by the end of 1954 when the Ferndale, Washington, refinery of General Petroleum goes on stream.

Thus, at the end of this year the markets for Western Canadian crude are estimated to be:

	<u>Barrels Per Day</u>
Prairie Provinces Refineries	130,000
Interprovincial - Eastern Canada	159,000
Trans Mountain	50,000
Total:	<u>339,000</u>

This is equivalent to 124 million barrels per annum compared to 81 million barrels of Canadian crude oil production in 1953, the latest year for which complete figures are available.

Now to deal with the possible additional markets for Western Canada crude. The principal Canadian market not presently served with Western crude is the marketing area served by refineries in and near Montreal, Quebec. Presently, refining capacity at Montreal is approximately 180,000 barrels per day. This is the largest single concentration of refining capacity in Canada and it may ultimately be an important market for Prairie crude.

A second possible outlet for Western crude exists in the Pacific Northwest States and off shore markets in California. As indicated earlier, Alberta crude is expected to provide a portion of the requirements of the General Petroleum Ferndale refinery scheduled to go on stream next month. The initial capacity of this refinery is expected to be 26,500 barrels per day, increasing to 35,000 barrels per day in 1955.

In this same area, Shell Oil Company is constructing a 50,000 barrel per day refinery at Anacortes, Washington, scheduled for completion early next summer. It is hoped that Alberta crude will be able to serve this additional outlet, and ultimately markets further South by pipe line and off shore shipments.

The second matter I wish to discuss with you today concerns the transmission of natural gas from Alberta to Eastern Canada.

Trans-Canada Pipe Lines Ltd. has recently received an Interim Permit from the Board of Transport Commissioners for Canada authorizing certain steps in the Company's plan to construct a 2,000 mile gas transmission line from Alberta. Trans-Canada presently holds a conditional permit from the Alberta Conservation Board for the export of 4.35 trillion cubic feet over the next 27 years at a peak day withdrawal of 540 million cubic feet.

You have heard and read a good deal about this project and I am sure you are familiar with its principal aspects. Today, I would like to emphasize three points in this connection.

First, it is of prime importance in considering this matter to recognize the close interconnection between the marketing, transmission and producing phases of this great natural gas project. In the Eastern Canadian marketing centres it is of basic importance that natural gas be priced at levels that will render it competitive with other fuels. The distributing utilities, to price their gas competitively, must be able to buy gas from the transmission company at attractive levels. We must remember that these utility companies are faced with substantial capital expenditures for the conversion of existing equipment and the construction of new service facilities. In turn, the transmission company must earn a fair return on its investment. Finally, what remains from this combination of transmission and distribution service is the producer's return for the sale of his gas.

This brings me to my second point, and it is the matter of adequate incentive: incentive for producers to construct processing plants, to build gathering lines, to drill wells to meet deliverability requirements, and to explore for additional reserves of natural gas. It is estimated that in the next few years, there will be invested in Alberta the following amounts in preparation for delivering natural gas to Trans-Canada Pipe Lines:

Trunk, Feeder and Gathering Lines	\$ 55,000,000
Gasoline and By-product processing plants	40,000,000
Development Wells	<u>40,000,000</u>
	<u>\$135,000,000</u>

I'm sure you will all agree that this is a substantial investment. Of major importance in each decision to invest will be this matter of field price and adequate incentive.

Finally, I would like to emphasize the rate at which natural gas reserves are increasing annually in Western Canada. The Alberta Petroleum and Natural Gas Conservation Board, in its report of May 10, 1954, estimated the established reserves of natural gas in Alberta to be 13.4 trillion cubic feet. In its earlier report of November 1953 the Board estimated that reserves could be expected to increase at an annual rate of $1\frac{1}{4}$ - $1\frac{1}{2}$ trillion cubic feet. In point of fact, reserves are increasing at an annual rate of approximately 2 trillion cubic feet.

In effect, this means that at least every three to four years sufficient reserves are being discovered to supply the 25 year requirements of a project the size of Trans-Canada Pipe Lines. In such circumstances, the need is apparent for constantly expanding markets for Western Canada's natural gas.

Gentlemen, this concludes my remarks. It has been a pleasure to address you.

APPENDIX "N"

"CANADIAN COAL IN THE YEARS AHEAD"

by

W. E. Uren,
Chairman,
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I have been invited to speak to you on the subject of coal. I would like to expand this subject somewhat and discuss the broader aspect of fuel energy with particular reference to the place of coal in that general field. Such an approach is necessary because as other fuels have become competitive with coal, it is no longer possible to secure any clear or comprehensive picture of the coal situation without reference to these other fuels.

Not too long ago, there were only two fuels in common use for power and heating, namely wood and coal. Oil was used for lighting and such gas as was used was produced from coal. The industrial development in the eighteen hundreds was only possible through the great increase in the supply of energy based on the increasing production and use of coal.

The first change in this situation was the introduction of the internal combustion engine which has taken over more and more of the transportation field. The first step in this process was the growing use of road transport either by automobile or by truck while the second step, the application of this engine as a direct replacement for the steam engine in both railway and marine practice, is now in full swing.

The tremendous growth in the demand for gasolines arising out of the first step in development not only spurred the search for new sources of crude oil but has also led to the production of large supplies of heavier oil as a by-product.

There is therefore this large and growing supply of heavier oil fractions available to energy or fuel users as by-products at prices based primarily upon the competitive cost of other fuels. This condition has had a serious effect upon the coal market since these heavy oils can be and are used for steam raising in stationary plants, locomotives and vessels for all of which coal was the usual fuel.

Over this same period, there has also developed on this continent a large and growing surplus of natural gas. This fuel is not adaptable for use in transportation but has very definite advantages in use in stationary plants. In the present period of expansion in Canada, this gas is also, in effect, a by-product since the main explorations are directed to discovering oil. Consequently the selling prices of this surplus fuel are also based upon factors other than the actual fuel value.

Canadian coal has been exposed to heavier competition from these two alternative fuels than has the imported coal. Both oil and gas are presently surplus in

Western Canada and have seriously affected the production and supply of coal from both the bituminous mines in Alberta and B. C. and the domestic mines in Alberta. There is also a surplus of heavy oil available on the Atlantic seaboard that is providing stiff competition to Maritime coal in industrial establishments.

In Central Canada, there is growing competition with furnace oil for the domestic market with some increase in the supply of the heavier oil fuels to industry.

It is pertinent to look somewhat more closely into this changing situation and to identify the chief factors that have led to this development.

It is true that there has been and still is a surplus of oil and gas over present market requirements and this surplus has intensified competition. It is also true that there is some point in costs or in financial returns where it would not be possible or advisable to force the surplus on the market. A comparative study of the changes in the cost of oil and of coal is both interesting and revealing.

The Dominion Coal Board have published every year a report upon the cost of production of Canadian coal by provinces. There is also data available on the cost of Bunker C oil at seaboard points. In July, 1947, this heavy residual oil was quoted at 8 1/2 cents per gallon in Montreal and in July, 1954, the quotation is 8 1/5 cents per gallon. In other words, there is practically no difference in the selling price in these seven years. It is fair to assume that if there has been no change in price in Montreal the same condition would apply to the Atlantic seaboard and the general statement can be made that Bunker C costs in the general Atlantic area are about the same in July, 1954, as they were in July, 1947. The chief Canadian supply of industrial coal in this area comes from Nova Scotia. In 1947 according to the reports submitted by the operators to the Board, the cost of production of N. S. coal was \$7.95 per net ton. In 1953 according to figures about to be published, the cost was \$10.41, an increase of \$2.46 per net ton.

On the West coast, the situation is similar with the price of Bunker C oil advancing only from 7.3 cents in July, 1947 to 7.5 cents in July, 1954, while bituminous coal produced in Alberta increased from \$4.31 to \$6.30 per net ton or \$1.99 at the mine and in B. C. the increase was from \$5.75 to \$7.03 or \$1.28 per net ton.

It must be clearly understood at this point that these statements are not intended to do more than recite the facts. The causes for the increases in coal costs, the necessities that developed in the operations of the mines are matters outside the scope of this study of the competitive situation.

These facts demonstrate, however, that one important reason for the loss of markets suffered by the Canadian bituminous coal industry lies in the substantial increase in the cost of production over the post war years. I believe it is also fair to say that if the cost of production of Canadian coal could be reduced by some miracle to the 1947 level, it would be possible to maintain outputs and distribution at a considerably higher level than at present.

As a realist, I must admit that I cannot have much confidence in the immediate development of such a miracle. The programme of mechanization in the Nova Scotia pits will, in time, lead to some lowering in this cost. In Western bituminous mines, however, the possibilities of reducing production costs is not so bright.

The question then is, what is the future prospect for coal and particularly for Canadian coal.

There have been several studies made of future energy requirements both in the United States and in Canada. These studies all agree in forecasting a very great increase in the demand for energy based upon the existing and evident growth in population. The rate of growth in Canada's population from 1951 to 1954, if continued will lead to a population of some nineteen to twenty million people in 1965.

These people will all need energy in some form or another. Even if the per capita requirement for this energy remains at the present level, the overall demand will be tremendous. It is, however, probable that, if no war emergency arises, the per capita demand will increase. This will force an even heavier load upon our energy supply.

How this projected demand for energy will affect Canadian coal is the question of most interest to us today.

The chief consumers of coal in Canada in the past have been transportation, house heating and industry in roughly equivalent quantities of about 12 million tons per year each while the production of coke and gas for blast furnaces, steel plants and city gas distribution has taken about 5 million tons per year. There are changes developing in each of these consuming divisions and these changes will have a definite effect upon the future of coal.

Transportation, as I have noted earlier, has become more and more dependent upon liquid fuels. Up to about 1952, the competition with coal in this field was chiefly from the truck and the automobile. The continuing growth in overall traffic was about equivalent to the growing proportion carried by these means and the tonnage of coal consumed by the railways remained at about the 11 to 12 million ton level. Since 1952, however, the effect of the invasion of the steam locomotive field itself by the diesel, and the replacement of coal in the steam locomotive by oil has become more and more evident. The railways have stated that no new steam engines are being built and the use of the existing engines is only being continued as long as can be economically justified. There is in progress, a study of the development of a gas turbine engine designed to use coal and also the possibilities of the application of this engine to locomotive use. It is thought that a locomotive of this type will show an economic advantage over the present diesel and probably over any other gas turbine type designed for oil. It must be admitted however, that any application of this new engine to transportation can only be a process of somewhat slow development over the immediate future. It is not realistic to expect that even the most successful development can affect the fuel requirements of the railways for some years. It follows therefore that we must look forward to a growing decrease in the coal requirements for our transportation systems with the possibility that at some date not too far away the railways may use no coal whatever and rely solely upon liquid fuels. This process of change will be very difficult to reverse because as the use of coal declines, so do the facilities for the supply. Storage and delivery facilities of coal are disappearing and are being replaced by the tank car, the storage tank, and the pipeline. It may well be that when the day comes, as it surely will, that the railways once more require coal, it will be cheaper and more efficient to transform the coal to oil by chemical process before delivery.

This process of change has weighed seriously upon the bituminous mines in Western Canada and will probably continue to do so. These mines have supplied up to 70% of their output to the railways and this loss of market has forced several closures as you all know. In the Maritimes, the drop has not been so drastic and the railways will probably continue to use some coal for some few years yet. The problem here is more one of cost since the Maritime coal has increased in price while the competitive coal from the U. S. has decreased.

One point more should be remembered in regard to transportation. This change to liquid fuels together with the noted prospective increase in population should create a demand in about 1965 for some 185,000,000 barrels of gasoline, diesel oil and Bunker oil. The total oil supply in 1953 of crude oil plus products was 192,000,000 barrels. It is evident that an increase of the magnitude noted in the demand for fuel for transportation may well have a definite effect upon the balance available for other uses as well as on the whole cost structure of the oil industry.

The retail or househeating trade consumes about as much coal as the railways. In this field also coal has been subject to competition from oil and in addition, from natural gas. The larger income recently enjoyed by Canadian families both from higher wages and from more wage earners per family has encouraged the purchase of a wide variety of labour saving devices. Prominent among these is the oil burner and the oil industry has been particularly fortunate in having the oil burner manufacturers and salesmen to do almost all the heavy selling with little if any need to do much to push the sale of the oil itself. Automatic coal burning equipment has not been pushed on the market and even the best of the modern types still requires more care and attention from the consumer than does oil. As long as incomes remain high, and the price of oil at about the present level, it is probable that this trend will continue although natural gas when more available will certainly provide increasing competition for oil.

If the present increase in population continues, there will be some 1,340,000 new households established between 1951 and 1965. If these all burn oil, the increase in demand would be about 33,500,000 barrels or double the total domestic use in 1952. The question arises whether in view of the large requirement for transportation, will this quantity of oil be available for domestic heating and if so, will the price continue to be attractive.

A very large portion of this new market will, of course, be taken over by natural gas which will probably also replace some present oil installations. In the cities where gas mains are available, coal may also lose some market but in the country the reverse may be the case. There is also the competition of bottled gas in the cooking field which will probably continue to cut into the sale of smaller sized stove coal.

On the other hand, there were in Canada in September, 1953 some 799,000 households in which wood was the principal heating fuel and 585,000 in which wood was used in supplementary heating equipment. Most of this consumption probably occurs in rural sections and small towns remote from any possible gas line connection. The supply of wood for fuel use will almost certainly decline over the coming years and a substantial portion of this market could be available for coal.

These facts show that there is still room for a substantial tonnage of coal in the domestic market. It must however be priced at that level where the consumer is more interested in cash savings than in the extra convenience and labour saving of oil and gas. There must also be a substantial improvement in selling technique and a greater development of interest by the producer and the retailer in the installation, maintenance and efficient operation of coal burning equipment in the consumer's cellar.

It may be noted that nature over the last two or three years has been kind to the oil consumer. We have had a series of exceptionally mild winter periods with a substantially reduced fuel consumption. The householder burning oil has had a lower heating cost than would normally occur and the suppliers and distributors have had no difficulty in maintaining deliveries. There could be a very drastic change in the situation if next winter should turn out to be 15% colder than normal instead of being, as last year, about 15% milder.

The third large consumer of fuel is the industrial market and the largest use of fuel by this group is for the production of process heat. Canadian industry is largely concentrated in the Central Provinces and the power used to drive the millions of machines is not derived from fuel but is usually electricity derived from water power. The largest fuel consuming group is the pulp and paper industry which uses tremendous quantities of steam for paper making and finishing.

Canadian industry requires for economical operation fuel that is dependable in supply, reliable in operation and reasonable in cost. In 1952, the cost of all material excluding fuel and electricity used by the manufacturing industries of Canada was over nine billion dollars and the gross value of the products was almost seventeen billion dollars. The cost of the fuel used was approximately two hundred and thirty six million dollars or some 2.5 per cent of the cost of materials and only 1.4% of the value of the product. The point in these figures is that the possible loss of a day's production due to faulty fuel, breakdown in fuel supply or other similar difficulties is of considerably greater importance than any ordinary variations in the cost of the fuel.

Coal, oil and gas can and do give satisfactory operation when used in the proper equipment while there is often a reduced requirement for operating labour in the use of oil and gas. There are also certain applications where the absence of ash, etc. is of particular value and in this field, oil or gas will find a ready market.

It is possible to ensure a dependable supply of oil by installing sufficient tankage with the necessary accompaniment of piping, heating coils, etc. although this constitutes an added cost both for installation and maintenance.

It is not so easy to ensure a dependable supply of gas and under ordinary conditions, the responsibility for supply will rest upon the distribution agency and will be outside the control of the consumer.

Coal in stock pile has provided and still does provide better and cheaper insurance against stoppages in operation than the other fuels.

It may be remarked in passing that it is not generally realized that Canadian coal is doing fairly well in this field. For example in 1947 when conditions had stabilized after the war, the cement industry in Canada used 560,396 tons of coal of which 188,547 or 33% was Canadian. In 1953, out of a total of 716,504 tons, 363,854 or 51% was Canadian coal.

The growth in population with the concurrent increase in demand for the products of Canadian manufacturers will lead to a substantial increase in energy requirements by Canadian industry.

Provided that consistent qualities and sizes of coal can be made available at competitive prices, it appears reasonably certain that not only will the industrial section of the market continue to depend upon coal in large measure, but that the overall requirements will increase with the growth in demand for manufactured articles by our enlarging population.

The use of fuel for the generation of electricity is a special application within the general industrial market. Until very recently, the use of fuel for this purpose was comparatively small and chiefly confined to the Maritime Provinces, Saskatchewan and Alberta. The tremendous growth in electric power requirements in Ontario forced the introduction of steam power into this area and until the recent accident to the Toronto plant, the two large fuel fired generating stations have been working at practically capacity.

Looking to the future, it appears that Nova Scotia will have to depend upon fuel for any increase in the supply of electricity. New Brunswick has a substantial potential hydro capacity in the Saint John River but it is only capable of full development at a comparatively high capital cost and subject to both international and interprovincial agreement on control of the headwaters. It is probable that the most efficient and economical course will be the joint or closely integrated development of both steam and hydro plants. Newfoundland has hydro resources but the production and distribution of power will for some time be governed by the factors of distance, transmission line costs and difficulties in construction of both plants and lines.

The Maritime area lags behind the central provinces in the per capita use of electricity partly because of higher cost and partly because of a lesser industrialization. A growth in industry and a growth in power load would help to lower average costs and provide a larger power market on a cumulating scale. The cost of fuel is evidently a very relevant factor in this area and coal is presently under severe competition from fuel oil. There would appear to be all the makings of a large and expanding market for Maritime coal in this industry provided that coal can be made competitive in cost and consistent in supply and quality.

The central provinces will, for some years, develop more and more hydro power. As and when the St. Lawrence development is finished and the power absorbed by the existing market, Ontario will almost certainly have to turn to fuel. Quebec with more undeveloped hydro sites will not be interested in fuel for some further period. This situation will have no effect upon the Canadian coal picture for many years.

The Prairie Provinces are largely dependent upon fuel for their supply of power. Studies that have been made by several authorities look forward to a joint development of steam and hydro as population expands. The ready availability of cheaply produced strip coal is a factor of importance and present indications are that the new generating stations will depend largely upon this coal as the chief fuel. There will be provision for the use of dump gas and bargain price oil but the use of these fuels will be neither lasting nor consistent in this particular field of consumption.

British Columbia with much available hydro power will probably not provide any early outlet for fuel.

In the long range view, the future fuel demands of the electric power industry are staggering. In the short range view, while there is in contemplation some increase in the market, further expansion depends upon the same factors as mentioned earlier, a reduction in cost, a build up of salesmanship and a betterment in consistency of quality.

Finally, the coke and gas industry and, in particular, the coking ovens of the steel plants provide the surest and most consistent coal outlets. Of our three large plants, one located in Sydney uses Canadian coal while the others in the Central Provinces are dependent upon American coal. The projected expansion in population will enlarge the market for steel. Whether this will be met by an expansion of present plants, or by the building of new ones or both is outside my particular field. There is considerable discussion of the economies and the possibility of establishing a steel industry in Western Canada and such a development would have a most beneficial reaction on Canadian coal.

I have reviewed for you in a general way the present and prospective markets for Canadian coal. There are in that review signs and portents of considerable changes in requirements and distribution. Old established markets are shrinking and the promise of newer ones shows in the future. What do these all mean in summary for the Canadian coal production industry?

In my opinion, it is evident that there does remain and will persist a large market for Canadian coal. New requirements will replace those outlets being lost to other fuels. The transition will not be easy or immediate but it appears to be firmly established that in the next twenty years there must be a great increase in coal demand.

In the industry itself, the cost of production will have to come down. It is probable that some present day producers will fall by the wayside due to the cost factor. New producers and new methods will come into being to fill this gap and coal will continue to be produced in quantity. It is a hard truth that any mine must sooner or later come to an end. That end may be either delayed or hastened by changing costs, new methods of production and other factors but it can not be finally avoided.

The Canadian coal producing industry has entered a period of severe readjustment, of changes in methods, of alterations in requirements and of new and severe competition. I remain fully confident that the miners, the engineers, the salesmen and the executives who make up that industry can and will meet this challenge and will rebuild this great industry into the larger and more efficient structure needed to meet the heavy demands now looming on the comparatively near horizon.

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